



# COAL AGE



Vol. 9

NEW YORK, MARCH 25, 1916

No. 13

## Don'ts for Bosses

## Big and Little

*Nothing will settle dust and so quickly as a smile. It is*

*level grades on life's highway both an antidote and a remedy.*



*Don't nag*—a good man can be nagged into inefficiency.

*Don't knock*—it helps you none and hurts your employee.

*Don't refuse advice*—you'll find many a man who can tell you many a thing you don't know.

*Don't advertise an employee's shortcomings*—tell him where he fails and tell the public his good qualities.

*Don't withhold advice*—others helped you to your present position. You owe it to them to pass their aid on to the next man. You're selfish if you don't.

*Don't hog all the glory*—it's a mighty small man who can't let credit go to those who have earned and deserve it. Is it not better to be the boss of men of reputation and known ability than of nobodies?

*Don't withhold appreciation*—it promotes loyalty. You consider it proper to put your employee on the carpet for poor work; that being the case, it is only fair that you express appreciation for labor well done.

*Don't pass snap judgment*—hear both sides of every story. Your men believe in you and base all their hopes for the future on your sense of justice and fair play. Don't disappoint them. A real boss can fire an employee without losing the man's respect.

*Don't be inhuman*—the same rules that prevailed a decade ago won't succeed today. An employee is no longer a machine. He ranks ahead of dividends. Corporations now assume obligations as to the health, safety and contentment of their men that were formerly unheard of. A workman's wage should include peace of mind as well as dollars. Money doesn't cancel all debts.

*When in doubt, put yourself in the other fellow's position*

# East Broad Top Coal Transfer and Preparation Plant

BY HENRY J. EDSELL\*

**SYNOPSIS**—A new plant for transferring coal from narrow-gage to standard-gage cars was necessary. This was constructed on the two-unit plan so arranged that the coal is not only transferred from one railroad to the other, but prepared for market meanwhile.

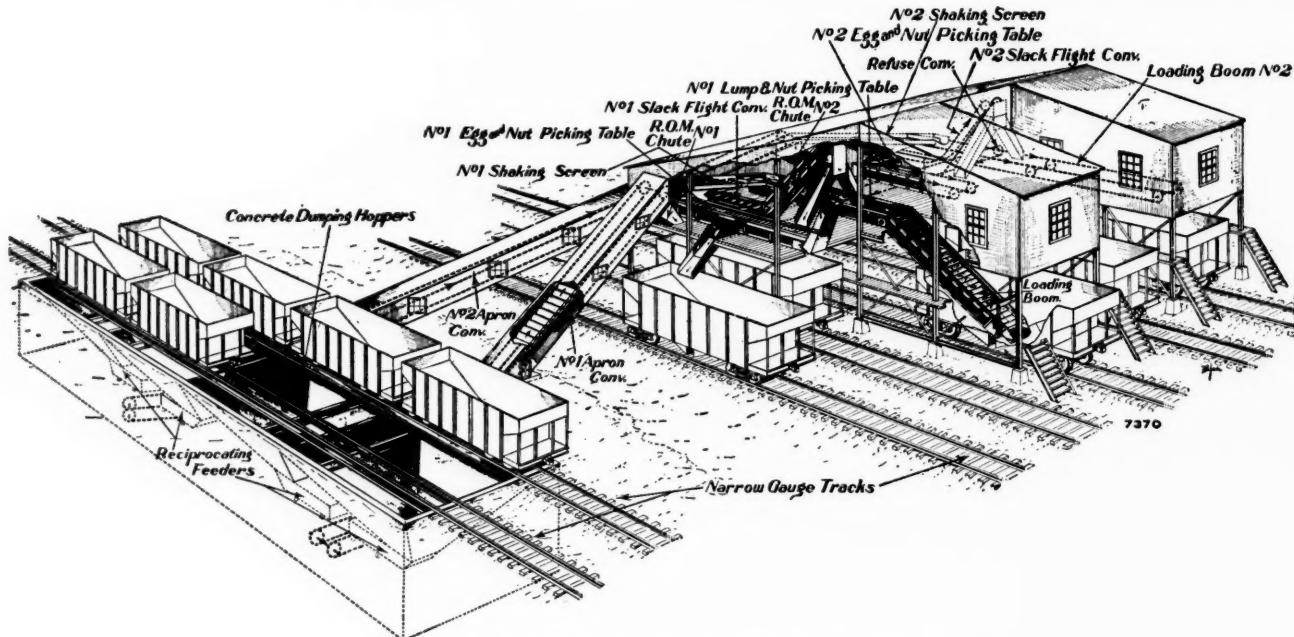
Back in 1856 some sportsmen spending their vacations in the mountains back of Mount Union, Penn., discovered outcroppings of coal. On further investigation these outcroppings were found to indicate valuable deposits, and a company was formed for developing them. This was the beginning of the East Broad Top Railroad and Coal Co. and of the first development of the East Broad Top Coal Region, though actual mining operations were not started until 17 years later.

In order to market this coal it was necessary to get it down to the main line of the Pennsylvania R.R. at Mount

extra labor required to get the coal out of the cars and down into the pockets when these pockets became filled, and more or less time was lost in the shifting of both kinds of cars. This shifting was complicated somewhat by the fact that the coal handled came from several mines, and the different kinds had to be kept separate.

The original timbers of the trestle lasted for many years, though some of them were replaced and the trestle was once rebuilt. A year or so ago, however, it was decided that the structure had reached about the end of its usefulness and would either have to be rebuilt or replaced with some other type of equipment.

The railroad company therefore made a thorough investigation of the various types of equipment which could be used to accomplish the desired results. The wooden trestle scheme was discarded largely on account of the greatly increased cost of timber construction, the poor quality of lumber obtainable at the present time and its limited length of life. A trestle of steel and concrete



TIPPLE AND PREPARATION PLANT AT THE TRANSFER STATION

Union. For this purpose a railroad was built, but on account of the saving in expense in the construction and equipment of the road, it was constructed with a gage of 3 ft. instead of standard gage. This meant that when the coal reached Mount Union it had to be transferred from the narrow-gage cars to those of standard gage for shipment over the Pennsylvania.

For accomplishing this transfer the engineers built a wooden trestle so that the narrow-gage cars could be run up to a sufficiently high level to drop the coal into pockets and then into the standard-gage cars alongside or underneath the trestle. This system was used for over 40 years with fair satisfaction, though there was some

construction was then considered, as well as a mechanical car-dumping equipment.

Both of these schemes were found to be quite expensive, and while they would accomplish the transfer, they would not provide for any improvement in the condition of the coal, by separation into different sizes and by picking, which methods are used in modern bituminous coal tipplers to enhance the value of the product and to make it more attractive to the trade. This feature of arranging for the preparation of the coal appealed strongly to the coal companies which shipped over the East Broad Top R.R., so that a decision was finally made in favor of a conveyor-transfer station equipped with shaking screens, picking tables and loading booms.

\*Philadelphia, Penn.

The accompanying illustration shows the general arrangement of the station. It is built in two units combined under one roof, either of which can be operated separately or in conjunction with the other. As the capacity of each unit is 300 tons per hour, one will be sufficient for handling the present output of the mines which ship over the road. The other unit will be used as a reserve. This will insure the station against a shutdown for repairs and will make it possible to overhaul one unit while the other is in operation, thereby making it easier to keep the plant in good operating condition. It will also avoid congestion, as both units can be operated together when an extra large amount of coal has to be handled in a certain time.

The car equipment of the railroad is fast becoming modernized and the latest cars are hopper-bottom steel cars of 70,000 lb. capacity, with three double doors in the bottom, this design being similar to the latest standard-gage steel cars. There are, however, quite a number of smaller wooden cars still in operation, so that the average capacity per car is considerably less than 35 tons. If the average capacity is taken as 25 tons, it is necessary to unload 12 of these cars per hour in order to secure 300 tons of coal.

The arrangement of the station is as follows: Two parallel narrow-gage tracks receive the loaded Broad Top cars. Underneath these tracks are built two pairs of track hoppers, each pair delivering coal by means of reciprocating feeders at the bottom to two main inclined apron conveyors. Each conveyor takes the coal up and delivers it to a double-deck shaking screen in the transfer building.

The upper deck of each shaking screen has large perforations and the lower deck smaller ones. At the discharge end of each shaking screen there is a main picking table which receives the large coal passing over the upper screen on one side and the smaller lump coal passing through the upper screen and over the lower one on the other side. This is at least the case where these two sizes of coal are to be shipped together. When they are to be kept separate, the smaller size, instead of going over the end of the lower screen, goes through a trap door, which can be opened for this purpose, and onto a secondary picking table.

The smallest coal, or slack, which goes through the perforations in the lower screen is collected by a gathering hopper and either delivered direct to standard-gage cars or elevated by an inclined flight conveyor located between the two picking tables to a height sufficient for delivery by means of a two-way chute to either of the two picking tables at the forward end. This arrangement makes it possible to pick two sizes of lump coal without interference from the presence of slack, since this tends to cover up the lumps and prevents effective picking.

In order to take care of the bone and slate which is picked from the coal there is a single refuse conveyor running at right angles to the picking tables and underneath the center of the picking space. Chutes are provided along the tables to receive the refuse and deliver it to the refuse conveyor, which discharges to a narrow-gage car standing on a track at one side of the transfer building.

Underneath the transfer building are four standard-gage tracks on which cars to be loaded are run in. The two main picking tables are equipped with loading booms,

or hinged extensions, which can be lowered into a car so that the coal can be delivered with a minimum drop and therefore a minimum breakage. The ends of these loading booms are raised and lowered by means of electric hoists. The coal from the secondary picking tables is delivered into the cars by means of inclined chutes which can be raised and lowered as desired.

There are also emergency run-of-mine chutes which can be used to deliver unprepared run-of-mine coal direct from the main apron conveyors to the standard-gage cars or to standard-gage locomotives when it is necessary to coal them. All the railroad tracks are set at a sufficient grade so that the cars can be dropped down into position by gravity. These standard-gage tracks have the "ladder" arrangement of switches so that a train of empty cars can be run in and split up so as to feed the cars down on the tracks under the transfer building. The switch points are kept far enough back so that there is in each case room enough for an empty car just behind the one being loaded, ready to take its place without delay.

#### TRACK HOPPERS ARE OF CONCRETE CONSTRUCTION

The track hoppers under the narrow-gage tracks are built mostly of reinforced concrete, but with steel plates forming a certain part of their construction. The track beams are supported on cross-walls and cross-beams. The transfer building and conveyor bridges are of steel frame construction covered with corrugated iron and amply provided with windows for light and air. The main apron conveyors and the picking tables are constructed with two strands of 9-in. pitch steel-strap chain with case-hardened steel bushings and flanged cast-iron rollers at the joints. The pans are of the overlapping corrugated type and made of  $\frac{3}{16}$ -in. steel plates. The tracks for the rollers are made of angle irons. The width of each main apron conveyor is 42 in., that of each main picking table 60 in. and each secondary picking table 36 in. The main apron conveyors are designed to operate at a speed of 80 ft. per min. and the picking tables at a speed of 40 ft. per min.

Each main picking table and loading boom conveyor has a capacity of the full 300 tons per hour, so that all the coal being handled through one unit can be loaded over this conveyor if desired. The secondary picking tables have each a capacity of 150 tons per hour. The slack conveyors are of the flight type with two strands of 12-in. pitch steel-strap roller chain and 10x30-in. flights of  $\frac{1}{4}$ -in. steel attached between the chains at 2-ft. intervals. These conveyors operate at a speed of 100 ft. per min. and have a capacity of 200 tons of slack coal per hour. The trough is made of  $\frac{1}{4}$ -in. steel plates. The refuse conveyor is of the simple block chain type with a block chain 9 in. wide sliding along in a  $\frac{3}{16}$ -in. steel trough. The refuse rides along on the chain or is pushed along in the trough by the chain itself. This makes a simple and inexpensive conveyor and one which costs little to maintain.

The shaking screens are 6 ft. wide and 24 ft. long, and each screen is suspended by means of four forged steel adjustable hanger rods. They are operated by means of pairs of heavy cast-iron babbitted eccentrics with wooden connecting-rods. The eccentric shaft runs at a speed of 110 r.p.m. The screens are constructed of  $\frac{3}{16}$ -in. steel plate sides and  $\frac{1}{4}$ -in. steel plate bottom, with sections of

lip screens arranged in both the upper and lower decks, so that the screens can be changed when it is desired to alter the size of the coal.

For present requirements the openings in the upper deck will ordinarily be  $5\frac{1}{2}$  and 6 in. by 8 in. slotted holes and in the lower deck  $1\frac{1}{4}$  and  $1\frac{1}{2}$  in. by 12 in. slotted holes. This allows of shipping 6-in. size and under, or from 6 in. down to  $1\frac{1}{2}$  in. The slack which is under  $1\frac{1}{2}$  in. is a good size of stoker fuel. With these screens the large lump coal would all be over 6 in.

This station is to be electrically operated by means of 220-volt, three-phase 60-cycle alternating current obtained from the local electric company.

The motors are as follows: One  $7\frac{1}{2}$ -hp. motor for operating each reciprocating feeder; one 35-hp. motor for operating one of the main inclined apron conveyors, which is 85 ft. c. to c., and one shaking screen; one 50-hp. motor for operating the other main inclined apron conveyor, which is 119 ft. c. to c., and the other shaking screen; one 35-hp. motor for operating the picking tables, including the loading booms, also the conveyors.

This transfer station is about as complete and up-to-date as it is possible to make it. It is unique in that while it is practically a tipple equipment it is not located at a coal mine. It might seem that the necessity for transferring the coal from narrow-gage to standard-gage cars

would be a distinct disadvantage, but it has its advantages in that a single transfer and preparation plant can handle the coal from a number of mines, so that instead of each mine requiring its own preparation plant, the railroad company offers these facilities as an added inducement for shipping the coal over its lines. As a matter of fact these facilities obtained an additional shipper for the railroad before the transfer station was actually put into operation.



### **Anthracite Tax Refunded**

There has at last been some action toward refunding the state tax to the retail coal dealers and other buyers of anthracite. The information came out through several of the big companies asking the larger dealers to present their bills covering the tax paid by them to the companies. The plan is to receive these bills, check them and then credit the amount to the account of the customer. It is a question whether this method will be satisfactory to all buyers, especially to those who have paid their bills promptly and are not indebted to the shipper to the extent of the amount due to be refunded. They can justly claim they paid the tax in cash and that they expect it refunded in the same way. It is just possible the matter will be further complicated by a suspension



HOLDING THE TRUMP CARD

of mining when the buyer will be unable for an indefinite period to "take the amount in trade."

There is great rejoicing, however; for although the detail work may delay the final settlement, the coal man feels at last he has something pleasant coming to him. His troubles may return later, if the public initiates a move for a refund. This is not at all improbable, as the newspapers have not yet learned of the matter; and when they do, they are likely to play the old tune that the coal man is overpaid, which seems to be the general opinion of the public. The tax which the companies are returning is only to cover the period up to the end of May 31, 1915, as the new and so far untried tax act went into effect on June 1 last year.

Several of the companies are refunding the tax, but there are several quite large concerns who have taken no action whatever in this direction. These are the companies who at the time the tax was levied beginning with July 1, 1913, simply added it into the circular price of the coal. The dealers are very anxious to know what these companies expect to do in this direction, as they really feel that they are entitled to the refund, for the reason when they bought such coal it was always at a higher circular price than that sold by the companies who are now refunding.

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### **Extracts from a Superintendent's Diary**

About twice a year we are inspected, lock, stock and barrel, by the company's safety inspector, who reports only to the general manager of the company. We are never advised in advance as to the dates of his inspections, and occasionally he manages to put in the greater part of a day before the foremen learn of his presence.

When the position was first created, everyone predicted that it would not last long. They looked upon it as only another fool notion of the "big boss," but the position developed into a surprise to us all, the general manager included. The first inspector was a young collegian who had never seen a coal mine, but was recommended for the job by a professor of one of the engineering colleges. The "G. M." had an idea that one who was not familiar with things taken as a matter of course by mining men might give us some pointers, and it turned out that he had reasoned well, only it happened that some of the pointers put the "G. M." on the defensive. For example, the inspector wanted to know why it was necessary to keep the tipple floor covered with black oil, thereby increasing the fire hazard, to say nothing of the apparent waste of money. It wasn't necessary at all, except that the manager had refused to approve appropriations calling for modern mine-car wheel equipment.

Since that time the general manager has never pigeon-holed an appropriation simply because it looked large and he has also given his inspectors (at any rate, we so suspect) instructions as to what to be on the lookout for.

Occasionally the inspector digs up something startling, and before we get through making explanations everyone is thankful that the "G. M." hasn't forgotten that first experience of his own with inspectors.

We are in the midst of such an experience at the present time. At our Shaft No. 5 we have a mine foreman, two assistant foremen and eight safety bosses. Today the safety inspector spent five hours inside of

that mine without meeting any of the bosses and that in spite of the fact that something happened that made it necessary for someone in authority to be found, and at least a dozen men were searching for one or all of them.

A trip of cars had been derailed near a temporary wooden overcast, and before the motorman could regain control of his motor, the overcast was rendered useless. No tools were at hand to repair the damage, and no one seemed to know just what to do in the absence of all the bosses. At first only the motorman and the trip rider were on the scene, but they were soon joined by several miners who happened along, and then the arguments began. They suddenly realized that not one of the bosses had a regular, appointed time for passing any particular place, and to go in search of any one of them would be like hunting for a needle in a haystack; and because something told them that quick action was necessary, they were all at sea. One thought that all the men in that one entry should be called out at once; it was known as a "hot" entry, and there was no time to lose. Another suggested that they must improvise an overcast at once, even before a man would have time to reach the face of the heading with a warning. Still another thought that a general alarm should be sounded so that all of the men could get out of the mine before any serious accident should happen.

Fortunately, the inspector happened along just then and took charge of things; he was not a man fresh from college, as the first inspector had been.

Why has no one had enough imagination to realize that bosses may be needed quickly? That is the question that will come back from the general manager's office in a day or so.

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### **Seven Thousand Miles of Underground Gangways**

Few people realize that there are over 7000 miles of underground tunnels in the anthracite mines of Pennsylvania. In a recent report of the Pennsylvania Department of Mines it was stated that the Philadelphia & Reading Coal and Iron Co. has more than 800 miles of timbered gangways and drifts, and there is a total of 2,000 miles of these underground ways in the Schuylkill region alone.

Anthracite statistics show that the proportion of coal shipped from the Schuylkill region since production has reached anything like its present proportions has been about 28 per cent. of the whole amount shipped. Therefore the remaining 72 per cent. shipped from the Lehigh and Wyoming regions must represent over 5000 more miles of these underground ways.

The greater part of this large underground mileage is now useless. All the coal that can be recovered has been taken from it long ago, but the constantly growing tunnels remain an increasing expense. The water that accumulates in them must be pumped out to protect adjacent workings.

One of the most serious problems of the anthracite coal operators has been the timbering of the mines. The Pennsylvania hills have been denuded of trees, and most of the timber now used is yellow pine from the South. Over \$5,000,000 a year is now spent by the operators for mine timbers and lumber.

# Adaptation of Modern Traverse Tables to Mine Surveys

BY L. D. TRACY\*

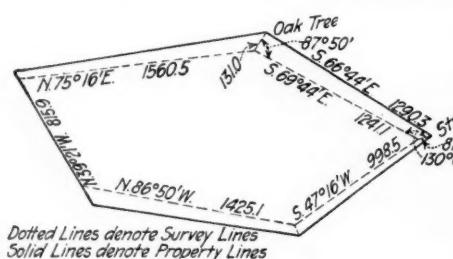
**SYNOPSIS**—A general description of the uses of traverse tables, with special reference to Gurden's tables, in connection with surveys, together with the origin and development of same. Some examples in average practice are given, as well as some unusual applications of the tables.

Among the engineers in the bituminous coalfields of western Pennsylvania three things are regarded as absolutely essential in making an accurate survey of the large properties, sometimes thousands of acres, operated by the coal-mining companies; namely, a steel or copper tape, a transit and an up-to-date set of traverse tables.

There are so many well-known and reliable makes of the two first-mentioned articles that further comment is unnecessary. The set of traverse tables which has been found to be most serviceable, and one which is almost universally used, is "Gurden's Traverse Tables," published in England by Charles Griffen & Co. and in America by Van Nostrand & Co.

## ORIGIN AND ARRANGEMENT OF GURDEN'S TABLES

R. L. Gurden, the author of these tables, while occupied upon a government survey of Victoria in Australia, found the already published tables so inadequate for his purpose



CALCULATION OF PROPERTY LINE				
COURSE	DIST.	LATITUDE	DEPARTURE	
		NORTH	SOUTH	EAST
5.22° 26' W.	131.0	121.1	49.9	
5.69° 44' E.	1241.0	429.9	1164.2	
N.60° 21' E.	81.0	40.1	70.4	
	40.1	551.0	1234.6	
551.0	1234.6			
40.1	49.9	5.6944'E		
5109	11847	1579.34'	87250' Def. Δ to left	
Log. 11847 = 3.073608		1579.34'		
Log. 5109 = 2.708356		1579.34'		
Log. Tang. of Course = 0.365272 = N.66°40' W.		N.22°26'E		
Log. 11847 = 3.073608		130°05' Def. Δ to left		
Log. Sin 5109 = 0.992944		N.60°21' E.		
Log. Length of Line = 3.10664 = 12903				

FIG. 1. SKETCH AND COMPUTATIONS OF A SURFACE SURVEY

that he resolved to prepare a set that would more nearly meet his own requirements. And he has given to engineers and surveyors of all countries a work which is invaluable.

The arrangement of the calculations which he has adopted serves to facilitate the purely mechanical work involved, and when compared with many other well-known tables saves a number of operations in arriving at the

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same result. These tables are computed to four places of decimals for every minute of angular measure up to one-hundred units of distance. If it should be found desirable to carry the computations to seconds, it is a simple matter to interpolate.

In Table 1 is a reproduction of the upper and lower portions of the page, the units of distance between 10 and 90 being omitted. The degree of the course for which the latitude and departure are to be determined may be found, if under 90° at the upper corners of the tables, and if over 90° at the lower corners, in a manner similar to that in any well-arranged table of trigonometrical functions.

The corresponding minutes of angle are to be found horizontally arranged at the top and bottom of the page, while the units of distance are placed in the extreme outside columns. The integral part of the corresponding latitude and departure is at the left of the decimal point in the two vertical columns on either side of the line running down the center of the page. Under the given minute column is the decimal part of the latitude and departure for the required unit of distance. The departure is found under the half of the page marked Sine and the latitude upon that part marked Cosine.

As an example, suppose the tabulation of the course N 23° 43' E for 936 ft. is desired. Under the column headed 43 min. and opposite the number 93 the latitude is found to be 85.1457, the 85 being the integral part in the column near the center of the page and the decimal number 1457 under the required minute of angle. For the number 930, which is 10 times the number 93, the decimal point is moved one place to the right, resulting in 851.45. Then applying the same method of procedure to the number 6, the result is 5.4933. The departure is found in the same way upon the opposite side of the page. As tabulated the operation would appear:

Number	Latitude	Departure
930	851.45	374.06
6	5.49	2.41
936	856.94	376.47

The advantages of this arrangement over that of the older tables, one of which is illustrated in Table 2, may be shown by a comparison of the number of operations involved to arrive at the same result. Using the same course and distance, without going into details as to the manner of using the table, the tabulation would be:

Number	Latitude	Departure
900	823.99	361.99
30	27.46	12.07
6	5.49	2.41
936	856.94	376.47

It can be clearly seen that one operation is saved, and in cases where large numbers are involved and a

quantity of them are to be figured, this saving of time and energy is quite an item.

The use of a traverse table, as has been stated, is an absolute necessity to an engineer making surveys of property or of the underground workings of a coal mine in which even ordinary accuracy is required; for by the calculation of the latitudes and departures of a circuit any error will be readily detected.

#### VARIOUS USES OF TRAVERSE TABLES

In addition to the advantage of detecting errors in the field there are other uses to which a traverse table can be put. In rough, hilly and wooded country it is impossible to follow on the ground the actual boundary lines of the property to be surveyed. In this case it is customary to run a skeleton survey around the property, following the lines of least resistance, and from this skeleton survey to take angles and distances to the landmarks governing the property line. Then by means of the traverse table the data for the boundary lines may be determined.

The point in question is illustrated in Fig. 1. The dotted line in the sketch indicates a random survey line, run wherever the physical conditions of the ground seem most advantageous. From various points tie lines are turned to the corners of the tract to be surveyed. The skeleton circuit is tabulated in order to detect any errors. If none is found, it is assumed that the field work has been correctly done, and the calculation is made to determine the courses and distances of the property lines. An example of the calculation of one line will be sufficient to illustrate the principle. In the sketch it is required to determine the direction and length of a line the ends or corners of which are fixed by an oak tree and a stone monument, and it is assumed that it is impossible to run the exact line between the two.

The first step would be to tabulate the skeleton survey, as shown in the table in Fig. 1. From survey points Nos. 1 and 2, angles are turned and distances measured from the main survey line to the two corners in question. A partial circuit is formed, one line only being necessary to complete it; this line naturally is the property line whose length and direction are desired. A tabulation of the three lines mentioned is made, the course of the two tie lines being figured from the deflection angles. This calculation is shown in Fig. 1 under the caption, "Calculation of Property Line."

The difference between the north and south latitudes is found, as well as the difference between the east

and the west departures. These differences give two sides of a right triangle, the base being along an east-and-west axis with its length equal to the difference in the east and the west departures. Similarly the perpendicular of the triangle is equal to the difference in the north and the south latitudes measured along a true north-and-south line. The hypotenuse of the triangle is the course and distance which it

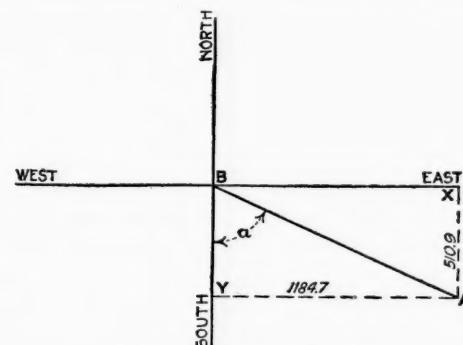


FIG. 2. METHOD OF COMPUTING

makes with the north-and-south line representing the course.

This explanation may perhaps be more clearly understood by referring to Fig. 2. In this figure the line  $AB$  represents the course and distance which is required,  $XA$  is the difference between the north and the south latitudes,  $AY$  the difference between the east and the west departures and  $a$  is the course or angle which the line makes with a north-and-south meridian. The tangent of  $a$  equals  $\frac{AY}{AX}$  or the departure divided by the latitude, while the length of the line  $AB$  equals the departure divided by the sine of  $a$ , or  $AY \div \sin a$ , the two results being the course and distance of the line.

#### SOME UNUSUAL APPLICATIONS OF THE TABLES

A certain line may be described in a deed by a given course and distance. In the field, however, only one of the landmarks fixing the line can be found, and it is impossible to directly run the line on the ground. In this case a partial circuit is made by the line in question, one tie line and the corresponding line of the skeleton survey. This partial circuit may be tabulated with a set of traverse tables, a closing line between the end of the survey and the opposite end of the property line from

TABLE 1. GURDEN'S METHOD  
(Note that the lines are omitted for figures from 11 to 90 inclusive)

	Cosine										Sine										23°	
	40'	41'	42'	43'	44'	45'	46'	47'	48'	49'	40'	41'	42'	43'	44'	45'	46'	47'	48'	49'		
23°	0.9063	0.8808	0.8547	0.8284	0.8019	0.7746	0.7473	0.7199	0.6924	0.6649	0.9063	0.8808	0.8547	0.8284	0.8019	0.7746	0.7473	0.7199	0.6924	0.6649	1	
1	0.9159	0.9158	0.9157	0.9155	0.9154	0.9153	0.9152	0.9151	0.9150	0.9148	0.4014	0.4017	0.4019	0.4022	0.4025	0.4027	0.4030	0.4033	0.4035	0.4038	1	
2	0.8318	0.8316	0.8313	0.8311	0.8309	0.8306	0.8304	0.8302	0.8299	0.8297	0.8028	0.8034	0.8039	0.8044	0.8050	0.8055	0.8060	0.8066	0.8071	0.8076	2	
3	0.7477	0.7473	0.7470	0.7466	0.7463	0.7459	0.7456	0.7452	0.7449	0.7445	0.2042	0.2050	0.2058	0.2066	0.2074	0.2082	0.2090	0.2098	0.2106	0.2114	3	
4	0.6636	0.6631	0.6627	0.6622	0.6617	0.6612	0.6608	0.6603	0.6598	0.6594	0.6057	0.6067	0.6078	0.6089	0.6099	0.6110	0.6121	0.6131	0.6142	0.6152	4	
5	0.5795	0.5789	0.5783	0.5777	0.5771	0.5766	0.5754	0.5754	0.5754	0.5742	0.0071	0.0084	0.0097	0.0111	0.0124	0.0137	0.0151	0.0164	0.0177	0.0191	5	
6	0.4954	0.4947	0.4940	0.4933	0.4926	0.4919	0.4912	0.4905	0.4898	0.4891	2.4085	2.4085	2.4101	2.4117	2.4133	2.4149	2.4165	2.4181	2.4197	2.4213	2.4229	6
7	0.4113	0.4105	0.4096	0.4088	0.4080	0.4072	0.4064	0.4055	0.4047	0.4039	2.8099	2.8099	2.8118	2.8136	2.8155	2.8174	2.8192	2.8211	2.8230	2.8248	2.8267	7
8	0.3272	0.3262	0.3253	0.3244	0.3234	0.3225	0.3216	0.3206	0.3197	0.3187	3.2113	3.2113	2.2135	2.2156	2.2177	2.2198	2.2220	2.2241	2.2262	2.2284	2.2305	8
9	0.2431	0.2420	0.2410	0.2399	0.2389	0.2378	0.2367	0.2357	0.2346	0.2336	3.6127	3.6127	6.151	6.175	6.199	6.223	6.247	6.271	6.295	6.319	6.343	9
10	0.1590	0.1578	0.1566	0.1555	0.1543	0.1531	0.1519	0.1508	0.1496	0.1484	4.0142	4.0142	0.168	0.195	0.221	0.248	0.275	0.301	0.328	0.355	0.381	10
91	0.3466	0.3359	0.3253	0.3146	0.3040	0.2933	0.2827	0.2720	0.2613	0.2506	36.5288	36.5288	5.530	5.772	6.015	6.257	6.499	6.742	6.984	7.226	7.468	91
92	0.2625	0.2517	0.2410	0.2302	0.2194	0.2087	0.1979	0.1871	0.1763	0.1655	36.9302	36.9302	9.547	9.792	*037	0.282	0.527	0.772	1.017	1.262	1.506	92
93	0.1784	0.1675	0.1566	0.1457	0.1349	0.1240	0.1131	0.1022	0.0913	0.0803	37.3316	37.3316	3.564	3.811	4.059	4.307	4.554	4.802	5.050	5.297	5.545	93
94	0.0943	0.0833	0.0723	0.0613	0.0503	0.0393	0.0283	0.0172	*062	0.05952	37.7330	37.7330	7.581	7.831	8.081	8.332	8.582	8.832	9.082	9.333	9.583	94
95	*101	0.9991	0.9879	0.9768	0.9657	0.9546	0.9435	0.9323	0.9212	0.9100	38.1344	38.1344	1.597	1.850	2.103	2.356	2.609	2.862	3.115	3.368	3.621	95
96	0.9260	0.9148	0.9036	0.8924	0.8811	0.8699	0.8587	0.8474	0.8361	0.8249	38.5358	38.5358	5.614	5.870	6.126	6.381	6.637	6.892	7.148	7.403	7.659	96
97	0.8419	0.8306	0.8193	0.8079	0.7966	0.7852	0.7738	0.7625	0.7511	0.7397	39.8373	39.8373	9.631	9.889	*148	0.046	0.064	0.0923	1.181	1.439	1.697	97
98	0.7578	0.7464	0.7349	0.7235	0.7120	0.7005	0.6890	0.6775	0.6661	0.6545	39.3387	39.3387	3.648	3.909	4.170	4.431	4.692	4.953	5.214	5.474	5.735	98
99	0.6737	0.6622	0.6506	0.6390	0.6274	0.6158	0.6042	0.5926	0.5810	0.5694	39.7401	39.7401	7.665	7.928	8.192	8.456	8.719	8.983	9.246	9.510	9.773	99
100	0.5896	0.5789	0.5663	0.5546	0.5429	0.5312	0.5194	0.5077	0.4960	0.4842	40.1415	40.1415	1.681	1.948	2.214	2.480	2.747	3.013	3.279	3.545	3.811	100
66°	20'	19'	18'	17'	16'	15'	14'	13'	12'	11'	20'	20'	19'	18'	17'	16'	15'	14'	13'	12'	11'	66°
	Sine																				Cosine	

\* Change to the next higher unit.

TABLE 2. ANOTHER TYPE OF TRAVERSE TABLE											
Lat.	Dep.	M	Lat.	Dep.	M	Lat.	Dep.	M	Lat.	Dep.	M
23°	D	M	Lat.	Dep.	M	Lat.	Dep.	M	Lat.	Dep.	M
1	40	0.9159	0.4014	41	0.9158	0.4017	42	0.9157	0.4019	43	0.9155
2	3	1.8318	0.8028	2.7477	1.2042	2.7473	1.2050	2.7466	1.2058	2.7463	1.2066
4	5	4.5795	2.6057	3.6631	1.6067	3.6627	1.6078	3.6622	1.6084	3.6617	1.6089
6	7	6.4113	2.4085	5.4949	2.4097	5.4940	2.4101	5.4933	2.4117	5.4926	2.4133
8	9	8.2451	3.6127	7.3262	3.2134	7.3253	3.2156	7.3244	3.2157	7.3234	3.2158
10	20	9.1590	4.0142	9.1578	4.0108	9.1566	4.0105	9.1555	4.0121	9.1543	4.0148
D	M	Dep.	Lat.	M	Dep.	Lat.	M	Dep.	Lat.	M	Dep.
66°											

which the tie to the survey line has been made. The closing line thus calculated, in exactly the same manner as the property line in the preceding case, will provide the data from which the corner may be set. These data are applied by setting a transit over the point in the survey line opposite the corner to be placed, the deflection angle between the survey line and the closing line is then calculated and turned on the transit, and the length of the closing line is measured. This will give the required point on the property line.

Another interesting illustration of the use to which a traverse table may be put is found in the location of a bore hole. This is shown in the sketch in Fig. 3, in which the entries of the mine are shown, the underground survey lines being indicated by dotted lines through the center of the entries. The survey line upon the surface of the ground from the location of the pump hole is clearly noted.

The surface location of a pump hole is generally governed by the proximity of a natural watercourse. The location having been definitely determined, the next step is to find, in the mine itself, the point corresponding to the one chosen upon the surface. In other words, referring to Fig. 3, the point numbered 8 must be directly under the station marked G.

A random survey line is run from the bore hole to a point near the entrance of the mine, this being represented by the letters A to G inclusive. This line is tied to Sta. 1 of the mine survey. The line in the mine is indicated by the numbers 1 to 7 inclusive. A partial circuit is thus formed, the line from Sta. 7 to Sta. 8 being the closing course to be calculated. This computation is performed in exactly the same manner as were the course and distance in the example immediately preceding. The result will give the data by which to drive an entry to meet the bottom of the pump hole. In order to avoid any chance of error in the field work two in-

dependent surveys are generally made, and the tabulation of each should give the same result.

The superiority of the Gurden tables seems to lie in the fact that the latitude and departure of a number of two figures may be found in one operation, while in most other tables two operations are involved. A simple contrivance which will aid the eye in following the columns of figures in the Gurden tables, thus facilitating the purely mechanical work, is made from a narrow strip of cardboard an inch or so in width which will reach across the page of the tables. Two parallel lines are drawn vertically across the narrow width of the cardboard. These lines are separated by a space equal to the width of the vertical

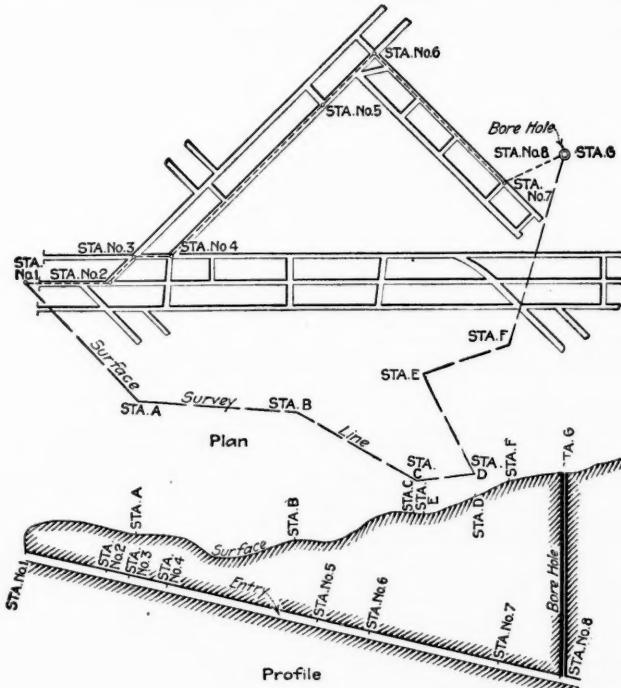


FIG. 3. SURVEY TO LOCATE A DRILL HOLE

column containing the figures under the minute column. The cardboard strip is placed on a page of the tables, the parallel lines coinciding with any given minute on the left-hand side of the page under the heading Cosine. Two parallel lines similar to those previously made are drawn coinciding with the corresponding minute column under the heading Sine. The space between each of these pairs of parallel lines is colored in such a manner that they will immediately attract the eye. This device will save a great deal of time and is exceedingly useful.

■

**Saving Virtues of the Tea in the Miner's Bucket**—Addressing the National Safety Council on Oct. 20, W. A. Lynott, United States Bureau of Mines, declared: "It has been a custom among miners, particularly coal miners, to fill the tops of their dinner buckets with tea for drinking purposes. Water is not much used to relieve thirst. This is a measure is a good practice, as the germs are destroyed in the boiling of the water preparatory to the making of the tea."

■

**Clarksburg, W. Va., Though a Coal Town, Burns Little Coal** because natural gas has practically taken its place on the local market. There is not a single retail dealer, and not over 15 tons of coal per week is consumed in the town. Yet Clarksburg is a hustling city with about 12,000 inhabitants and has a foundry, machine shops, zinc works, glass, tin-plate, chemical, graphite, sanitary earthenware, coffin and carriage factories, flour and lumber mills, a brewery and brickyards.

## Coal Shipping from China and Japan

By F. J. WARDEN-STEVENS

**SYNOPSIS**—*The coal fields of China and Japan are of increasing importance in view of the changes in the world's coal markets brought about by the European War. The various large ports and their coal-handling equipment are described.*

In the conflict now raging over Europe, we doubtless naturally give less thought to the Far East than to the state of affairs nearer home. The part being taken by Japan, however, to make secure against German aggression

for it owing to the limited output and because it is requisitioned for naval use. It is an even-burning coal of good heating value, with low ash content, and produces little smoke; in fact, it is generally compared with our average North Country coal and has an analysis approximately as follows: Moisture, 1; volatile, 31; carbon, 63; ash, 5.

There are several other grades, both large and slack, produced from these mines, the better of which are shipped as bunkers at Chinwangtao, and also cargoes—chiefly consigned to Shanghai, Honkong and other Chinese ports



PRIMITIVE COAL WHARVES AT THE IMPORTANT PORT OF SHANGHAI, CHINA

sion and increase of power in China is of no little importance, and thus we are indirectly reminded of our subject.

The coal resources of China are computed to be enormous, as is fairly well known; briefly there awaits development an output stated to be comparable with that of the United States and of about an equal average quality.

Tsingtau has been the shipping port from the Shantung coalfields, producing both anthracite and bituminous coal, which have been practically under German control or influence. To the north of Tsingtau is situated Weihaiwei the British base, at the entrance to the Gulf of Chihli, across which it is an almost straight course to the port of Chinwangtao. Chinwangtao has now become prominent in connection with the shipment of coal from the Chihli fields, from which the largest output of China's coal resources is at present obtained. The Kaiping mines, with an output of about 7500 tons per day, are situated near this port, and they are perhaps the most important of those on the Chihli fields and produce a bituminous coal. The best class of this coal is in considerable demand for bunker supplies, but it is difficult to arrange contracts

for railway use. Bunker supplies are frequently mixtures of large and slack in equal proportions, or two to one. It is perhaps unnecessary to add to what we have said regarding the coal from these mines; rather we may direct interest to the port.

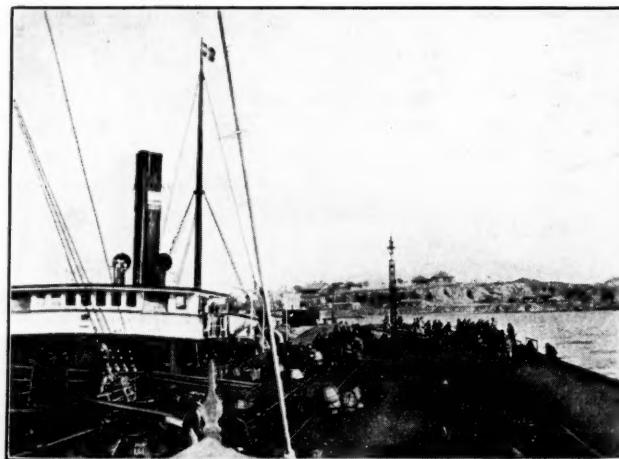
### AN IMPORTANT ALL-YEAR PORT

A special feature of Chinwangtao is that it is available at all times and seasons of the year, unlike the other ports of northern China, which generally are not accessible in the winter owing to ice. The port is protected by a breakwater of curved form, 2400 ft. in length from the shore, but which is now being extended a further distance of 200 ft. The quay of this breakwater, which is 66 ft. in width, is served by a double line of railway track, and there is berthing accommodation for five vessels ranging from 275 ft. to 600 ft. in length, drawing up to 21 ft. of water.

In addition to the breakwater, and also extending from the shore to the west, is a pier 1673 ft. long, the head of which, together with that of the breakwater, forms the

harbor entrance, 907 ft. in width. The area of the harbor is 30 acres, and it has a depth of from 15 to 22 ft., but is being increased to a depth of 25 ft. throughout. The pier provides accommodation for two vessels 300 ft. in length and is also served by railway tracks.

As regards facilities for loading, the railway cars come right alongside the steamers, from which coal is filled into baskets and carried by native labor, as usual at Chinese ports so far. Examples of quick working, however, indicate that a vessel can receive 100 tons per hour, and extensions in progress at the port are providing siding



COAL BUNKERING AT CHINWANGTAO

accommodation to enable about 7,000 tons to be dealt with per working day of 18 hr., night work being possible as both the breakwater and pier are lighted by high candle-power lamps. This may be considered a fair example of coal shipping from China.

Other ports in the Gulf of Chihli where coal is loaded are Tangku, and Taku about 120 miles southwest of Chingwangtao. It may here be mentioned that further northeast of the Chihli fields is the Manchurian coal field of Fushun, which has a vast tonnage available. This coal field is situated about 20 mi. east of Mukden, the nearest shipping port to which is Newchwang. This coal field has an output of about 5,000 tons per day at present, but there are prospects of extensive developments.

#### OTHER IMPORTANT COALFIELDS

Other coalfields of China with great resources are Shansi and Hunan. As regards the mines in Hunan they are situated about midway between Shanghai and Tientsin, but at present no direct railway connections exist. Proposals, I believe, have been made to facilitate the shipment of this coal either by rail to Hankow and thence to Shanghai by light-draft vessels to enable passage down the Yangtse River. An alternative arrangement for shipment which has been considered is from Tientsin via rail to Peking. At Tientsin, variation of the water level in the Yangtse River amounts to no less than 40 ft., so that shipping is complicated, especially in winter, when the river is at its lowest and craft have to be moored about 200 ft. from the river bank and connected by pontoons with the shore.

Shanghai and Hongkong are of course prominent bunkering and receiving ports for coal.

Now, as regards Japan, we will first refer to the southern island, from which about three-quarters of the present

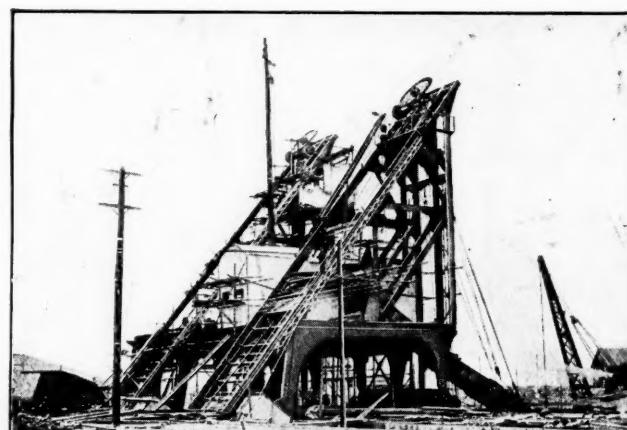
coal output of that country is obtained, the ports of shipment including Nagasaki, Moji, Wakamatsu, Miike, Kuchinotsu and Karatzu. Moji is the chief of these ports as regards tonnage of coal shipments, but it is here proposed to refer more particularly to Miike on account of the special mechanical equipments which have been introduced there. The coal is received at Miike harbor by the mine railway, in four- or eight-ton cars, in which it is conveyed a distance of about 3 or 4 miles.

#### METHOD OF HANDLING THE COAL

At the harbor are extensive storage sidings, one having a capacity of some 50,000 tons. This serves a series of five high-level trestles, each of which is constructed on a tunnel 13 ft. in width. The coal wagons are hauled from the sidings over the trestle tracks and there discharged; thus a coal storage pile is formed over each tunnel. The tunnels are provided with loading doors on each side so that trucks can be loaded by gravity from the storage piles. These trucks are then hauled in trains of five or six cars at a time by electric locomotives to a track at the back of the coal-shipping quay, first passing over an electric automatic recording weigh-bridge.

Without going into detail, these coal loaders may be described briefly as being in appearance more like a furnace-charging hoist than a hoist of the type used for coal shipping. A steel skip with a capacity of 8 tons is used, in which the coal is hauled by a wire rope up a track, supported by the structure at an inclination of about 45 deg., and it is then automatically tipped forward, discharged into hoppers and thence loaded by adjustable chutes, with antibreakage attachments, double screening being provided for in the course of tipping.

These loaders are supported on a gantry with wheelbase and can be moved along the quay on rail tracks. They are about 67 ft. in height and the gantry, which is 40 ft.



COAL-LOADING EQUIPMENT AT MIKE HARBOR

in height, spans a double line of rails. The inclined hauling track is adjustable so that the height at which the skip is discharged can be varied to suit the conditions of loading, and the chutes have a vertical range of 30 ft.

Each of these three equipments is operated by two electric motors, the larger being used for hauling the skip and the other for adjusting the chutes and moving the loaders along the quay to different positions. These equipments can load 5,000 tons each per day. The skips are loaded in recesses constructed at the back of the quay adjoining the wagon track, by hopper chutes, the empty

trucks continuing their course back to the tunnels for reloading.

As regards to the port of Miike, which has only been available some six years, it comprises an outer harbor giving access to an inner harbor which is entered by a channel 6000 ft. long, formed by two jetties 440 ft. apart, which provides a deep-water course 18 to 30 ft. deep at low tides respectively, and with a width of 150 ft., to be increased to 250 ft.

The inner harbor, which has an area of 124 acres, is protected by two breakwaters each 3000 ft. in length. Leading from the inner harbor is a dock of 32 acres water area with a minimum depth of 28 ft., this is controlled by a lock, the entrance being 66 ft. wide and 28 ft. deep.

The output from the Miike collieries is from 6000 to 7000 tons per day, nearly half of which is exported either as cargoes or for bunker supplies. It is a good steam coal, having an evaporative power of 9, but is also in demand for gas works, being highly bituminous and producing about 11,660 cu.ft. per ton. The export markets for this coal extend to Singapore, Manila and Java.

Other coalfields in the southern island of Japan include Karatsu, near that port, and Chikuhu, the nearest ports to which are Moji and Wakamatsu. This field is computed to have resources exceeding 85 million tons.

Coal is shipped from the central or principal portion of Japan at the ports of Yokohama and Yokosuka, Kobe and Tsuruga, the best known coalfields being Nagato and Iwaki. As regards the northern island of Hokkaido, this is stated to possess the greatest resources of coal in Japan, amounting to upward of 600 million tons. The ports for shipment of this coal are Hakodate, Otaru and Mororan.

#### AN INTERESTING INSTALLATION

It may be of interest to refer to the arrangement of supplying bunker coal at Mororan. Coal is received in the railroad car and loaded by coolies into bags made of straw and holding about 15 lb. These bags, one in ten of which are weighted, are then carried to lighters, with a capacity of about 50 tons. These are towed out and alongside the steamers. About 12 of the bags at a time are then placed in a large rope basket and hoisted aboard by the vessel's winch. Although something like 3000 tons can be supplied in 12 hours in this manner, to three or four steamers at a time, it will be realized that it calls for a large number of coolies; in fact, for that service about 350 men are required on land and about 250 in the lighters and vessel, while about 60 or 70 lighters will be used.

Only a mere outline of the subject has been attempted here, to indicate the future for the coal industry of both China and Japan on account of the great resources available in those countries.

\*

#### Mining with Electric Shovels

While the use of electricity in connection with what is ordinarily known as the steam shovel is not entirely new, the Piney Fork Coal Co. is the first to adopt it in the mining of coal, according to the statement of its management. The comparatively few coal-stripping operations in the United States give opportunity for accurate observation in the matter.

Furthermore, it is claimed on authority of the manufacturers of the shovel now being used by this company near Steubenville, Ohio, that this device is the most

powerful of its nature ever produced. It has a 90-ft. boom, surpassing in size that of the largest shovel used in the Panama Canal excavations. It will cut a bank 50 ft. deep, thus reaching the lowest point necessary in uncovering the coal seam anywhere within the 5,000-acre tract which the company is to develop.

This shovel has a 5-yd. dipper, which, attached to the long boom, will displace earth over a strip 135 ft. wide. The weight of the entire machine is estimated at 242 tons. A smaller shovel, having a 24-ft. boom and weighing 44 tons, is to be used in the actual mining of the coal after it has been uncovered.

Current will be supplied by a traction company from its power plant at Wheeling, W. Va., a distance of 12 or 15 mi. from the mining operations. At the point of tapping the feed wire the traction company will reduce the 66,000 volts to 4,000 volts, and a motor-generator connected with the big shovel will convert this to 250 volts direct current. Greater efficiency is expected from electric power, as contrasted with steam, in lessening the chances of interference with operations, particularly in cold weather. One of the troubles avoided is the freezing of aboveground water pipes. Delay from wet steam after a temporary shutting off of power is another annoyance that will be eliminated.

The small shovel, working on the excavated level, will attack the coal in strips 1 3/4 yd. in width. The process of loosening, or "shooting," the coal mass is much the same as that employed in underground mining. It is attended, however, with the necessity of much less precaution and can go on faster, besides not demanding labor of a high degree of skill.

The new electric operations will have a capacity of about 1,500 tons per day, but will start off with an output of only 1,000 tons. A force of 30 men, it is estimated, will be all that is required. The economy of stripping as compared with shaft or slope mining is shown by the fact that 300 miners would be employed underground in producing the same quantity of coal.

The small shovel can load 5-ton mine cars at the rate of about one per minute. These will be strung along the excavated space on temporary tracks and shifted within reach of the dipper, as required. Small locomotives will convey them to the tipple, where the coal will be dumped into railroad cars. Less degradation of the coal results from its being picked up by the power shovel than if loaded into mine cars in small quantities by miners.

The sentiment has developed in eastern Ohio against stripping, on the ground that it will leave the territory in a scarred, unsightly condition. This kind of mining has been in progress in a small way in Jefferson County for a year or more. The extensive nature of the new enterprise, which controls a stretch of land 5 mi. in length, has awakened alarm, not only because of the desolation it will cause individually, but also for fear that further development of the same nature will follow.

The business men's organization of Steubenville has passed resolutions condemning stripping, and the matter has been placed in the hands of attorneys to see whether grounds for an injunction can be found. Another plan is that of asking for the passage of a state law requiring that excavations be filled up and the ground leveled off after the coal is exhausted. Inasmuch as the Piney Fork company owns the ground in fee simple, it declares that it has no fear of an injunction.

# Calculation of Mine Dams

BY A. G. MORLOCK\*

**SYNOPSIS**—It is sometimes necessary to flood a portion of a mine in order to extinguish a fire. A method is here outlined whereby gangway dams of a safe strength may be calculated.

Mine fires are of frequent occurrence, and sometimes—usually as a last resort—it is found necessary to flood a portion of the workings to extinguish the conflagration. To accomplish this purpose a dam is built in the gangway to isolate the portion of the workings affected.

The dam must be calculated to resist the pressure of the greatest head of water that may possibly come against it; and to insure safety, it must have a good firm bearing in both walls and also in the floor and roof.

To resist great heads of water, dams must be built of brick, masonry, plain concrete or reinforced concrete. An estimate of the costs of each of these types of dams shows that a brick or masonry structure is the most expensive, costing about 30 per cent. more than one of plain or reinforced concrete.

The reinforced concrete dam has the advantage that it may be constructed to resist the same head of water coming on either side, as it will take tension as well as compression; and the additional cost will be only that of the steel reinforcement. Brick and plain concrete dams must be in compression only, as their tensile strengths are very low; hence, these dams will resist a head of water coming only on the convex side.

The methods for calculating brick, masonry and plain concrete dams are identical, except that the compressive strengths vary. The safe compressive strength per square inch for brick-work in cement mortar may be taken at 250 lb. and for plain concrete of 1:2:4 mixture at 300 lb. The strength of masonry varies with the different kinds of stone used. In order to illustrate the principles for calculating brick and reinforced-concrete dams, the following problem is introduced:

**Problem**—A dam is to be built in an 8x12-ft. mine gangway to withstand a 320-ft. head of water.

## A BRICK DAM

**Solution No. 1**—The pressure on the dam due to a 320-ft. head of water equals  $62.5 \times 320 = 20,000$  lb. per square foot of surface. It is customary in designing dams to consider a vertical strip 1 ft. wide, as this facilitates calculations. To get the best results the radius of the concave side of the dam should never exceed the span. In this problem we will make the radius 12 ft.

The thickness of the dam must be assumed and trials made until one is found that satisfies all conditions. In

this problem, after several trials, 8 ft. 9 in. was found to be the proper thickness of the dam.

After deciding on the radius and thickness of the dam, draw a plan of one-half the dam and gangway, as shown in the accompanying illustration. Then dividing the thickness into three equal parts, as shown by lines *ab* and *cd*, it is found that the point of application of the horizontal thrust is 2 ft. 11 in. from the face of the dam, and the inner limit of the line of pressure at point *a* is 2 ft. 11 in. from the concave surface of the dam. Then dividing the gangway into 1-ft. spaces, each space representing a pressure of 20,000 lb., draw lines 1-2-3-4-5-6 through the center of each load and continue these lines through the dam.

Then taking the moments about point *a*, we have:

$$\begin{aligned} 20,000 \times 1.96 &= 39,200 \text{ ft.-lb.} \\ 20,000 \times 2.96 &= 59,200 \text{ ft.-lb.} \\ 20,000 \times 3.96 &= 79,200 \text{ ft.-lb.} \\ 20,000 \times 4.96 &= 99,200 \text{ ft.-lb.} \\ 20,000 \times 5.96 &= 119,200 \text{ ft.-lb.} \\ 20,000 \times 6.96 &= 139,200 \text{ ft.-lb.} \\ &\hline 535,200 \text{ ft.-lb.} \end{aligned}$$

This divided by the lever arm 4 ft. 11 in. gives the horizontal thrust *H* at point *d*:

$$H = \frac{535,200}{4.9} = 109,224 \text{ lb.}$$

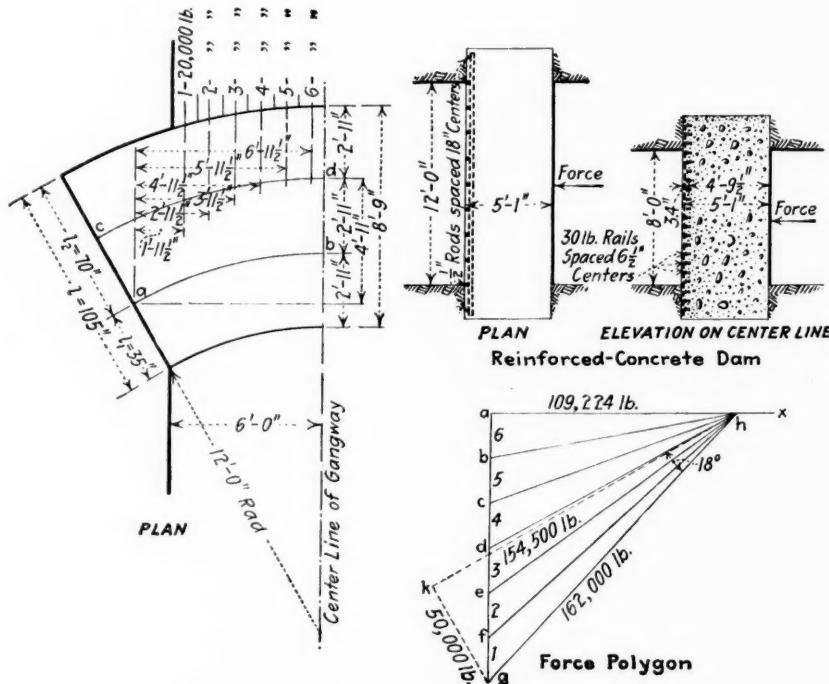


DIAGRAM OF DAM AND FORCE POLYGON

When the horizontal thrust is greater than the sum of the loads on one-half the dam—in this case 120,000 lb.—the compressive stress on the brickwork will exceed its safe strength, in which case it will be advisable to increase the thickness of the dam and try again.

Now we proceed to lay out the force polygon. First, draw a horizontal line *ax* and on this line mark off *ah* equal to 109,224 lb. From point *a* drop a perpendicular

\*Lansford, Penn.

and on this line mark off the loads 6-5-4-3-2-1, each equal to 20,000 lb., and connect these points with  $h$ . Now through point  $d$  in plan draw a line parallel to  $ah$  in the force polygon until it intersects load line 6; and from this point of intersection draw a line parallel to line  $bh$  until it intersects load line 5. This process is continued until the line of pressure is completed, the final line  $gh$  intersecting the bearing line at point  $a$ . Line  $gh$  represents the resultant thrust on the bearing line, and by scaling is found to be 162,000 lb.

The line of pressure should lie wholly within the middle third to insure stability.

Resolving the thrust, 162,000 lb., into its components parallel and perpendicular to the bearing line, as shown by dotted lines in the force polygon, it is found by scaling lines  $kh$  and  $gk$  that the perpendicular pressure is 154,500 lb. and the tendency to slide is 50,000 lb., angle  $khg$  being 18 deg.

To insure stability against sliding, angle  $khg$  should never exceed 25 deg.

Substituting in the formula

$$k_1 = \frac{2P(2l - 3l_1)}{12l^2}$$

in which  $k_1$  equals pressure per square inch on bearing line,  $l$ ,  $l_1$  and  $l_2$  are as shown in the plan and  $P$  equals vertical pressure on bearing, we have

$$k_1 = \frac{2 \times 154,500 [(2 \times 105) - (3 \times 35)]}{12 \times 105^2} = 245.24 \text{ lb.}$$

As 250 lb. per sq.in. is the allowable load on brick-work in cement mortar, the dam is safe in regard to compression. The tension  $k_2$  per square inch is found by the formula

$$k_2 = \frac{2P(2l - 3l_2)}{12l^2}$$

$$k_2 = \frac{2 \times 154,500 [(2 \times 105) - (3 \times 70)]}{12 \times 105^2} = 2.34 \text{ lb.}$$

#### REINFORCED CONCRETE DAM

Solution No. 2—Taking the tensile stress of steel at 16,000 lb. per sq.in., the compressive stress of concrete

at 650 lb. per sq.in. and the ratio of moduli of elasticity at 15, in Taylor and Thompson's textbook entitled "Concrete, Plain and Reinforced," we find the safe working value for constant  $C$  to be 0.096 and the ratio of steel to concrete section  $P$  to be 0.0077.

Considering the dam as a beam with a span of 12 ft. and solving for a vertical strip 1 ft. wide, the bending moment  $M$  in inch-pounds is found by the formula  $M = 1.5 wl^2$ , in which  $w$  is the pressure per foot of span and  $l$  is the span in feet.

$$M = 1.5 \times 20,000 \times 12 \times 12 = 4,320,000 \text{ in.-lb.}$$

The distance from the face of the dam to the center of the steel reinforcement  $d$  is found by the formula

$$d = C \sqrt{\frac{M}{b}}$$

in which  $b$  is the depth of the vertical strip under consideration.

$$d = 0.096 \sqrt{\frac{4,320,000}{12}} = 57.6 \text{ in.}$$

To the thickness thus found must be added the distance from the back of the flange of the rail to its neutral axis (1.4 in.), and also 2 in. to properly embed the steel to prevent corrosion, making a total of 61 in., or 5 ft. 1 in.

The sectional area of steel  $A_s$  is found by the formula  $A_s = pbd = 0.0077 \times 12 \times 57.6 = 5.322 \text{ sq.in.}$

Thirty-pound track rails having an area of 2.9 sq.in. may be used for reinforcement.

$$\frac{5.322}{2.9} = 1.84 \text{ rails per vertical foot of dam}$$

$$\frac{12}{1.84} = 6.52 \text{ in. or } 6\frac{1}{2}\text{-in. centers}$$

To prevent surface cracks  $\frac{1}{2}$ -in. rods spaced on 18-in. centers should be wired perpendicularly to the rails.

If it is desired that the dam may take a head of water coming from either side, it will only be necessary to place the same amount of reinforcement in the face of the dam without increasing the thickness.



## Methodical Pillar Drawing\*

By W. N. WETZEL†

**SYNOPSIS**—Advocates the saving of coal by carefully planned pillar drawing and shows the conditions which should be satisfied to attain that end. Discusses the mining of superimposed beds by usual and by caving methods.

In visiting some of the older mines in this country one feature which is most likely to be impressed upon one's mind is the great economic loss caused by the mining methods that were in vogue 30 or 40 years ago.

In many of the older mines, especially throughout the East, great areas of coal may be found which, owing to improper methods of mining, are forever lost.

In the early days of mining the supply of coal was considered inexhaustible, and coal lands could be se-

cured for little or nothing. For these reasons the question of pillar drawing was at that time given no consideration, or if considered, the decision was against the drawing of the pillars and in favor of the system which has since been called the "hogging" method of mining. This latter simply means the extraction of as much coal as possible from a given area in as short a time as possible, regardless of whether that final extraction is 25 per cent. or 100 per cent. of the total.

It is now realized that the drawing of pillars is perhaps the most important factor to be considered in connection with the economical extraction of any certain piece of coal which it is found necessary to mine by the room-and-pillar method. The importance of this feature of mining can perhaps be best illustrated by the following example:

Assume a piece of coal 2,200 ft. long and 550 ft. wide, the coal being 10 ft. thick. We find that such a piece of coal would contain approximately 27.76 acres, or 277.6

\*Paper read before meeting of Utah Fuel Co. employees at Sunnyside, Utah, Oct. 29, 1915.

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acre-feet. Assuming 1,600 tons per acre-foot, we find that the tract would contain 444,160 tons of coal. Placing a royalty value of 10c. per ton on this coal, we find that its total value in the ground is \$44,416, or \$1,600 per acre, which value is not at all excessive when it is considered that certain tracts of our best coking coal have in the past been sold for as high as \$3,000 per acre.

With the mining methods in vogue during the early days of mining in this country two entries would probably have been turned off in this tract, rooms would have been turned off the entries and crosscuts off the rooms, the whole operation being performed with the sole idea of securing as much coal as cheaply as possible in any one day, regardless of what coal might be lost or what coal might cost on the day following.

As a result of this system (or lack of system) entries were driven on a so-called water-level grade, the water level oftentimes varying to such a great extent in the two entries that a pillar from 2 to 10 ft. thick was all that was left between them; entry crosscuts were driven at the most convenient places; rooms were turned as needed and were driven any width which might best suit the convenience of the miners, regardless of the size of the pillar, room crosscuts being usually made whenever a miner could follow a slip or a piece of coal which worked easily. This easy working he would avail himself of until he had holed through to the room adjoining.

As a result of all this, the pillars left to support the overlying strata were entirely too small to serve this purpose, and the place either caved and was abandoned or a squeeze or a creep came on, entirely closing up a district.

#### FORTY PER CENT. A HIGH RATE OF RECOVERY

In checking up the amounts of coal recovered from areas mined in this way it will be found that 40 per cent. of the total was a high rate of recovery. Assuming this as a fair figure, the value of the coal left in the ground in the tract mentioned would have been \$26,649.60. With more modern methods we could assume a total recovery of 85 per cent., or the value of the coal left in the ground would be \$6,662.40. With still more modern methods—the ones which will no doubt be used in mining operations of the future—we could figure on a total recovery of 95 per cent. Using this figure, we find that the value of the coal left in the ground would be \$2,220.80. This, then, would show a total saving between the older mining methods and the more modern, in the mining of a tract containing 27.76 acres, of \$19,987.20, or a saving of \$720 per acre, which is 45 per cent. of the total value of the coal in question.

The difference between the most crude and the most modern methods of mining would show a total saving on 27.76 acres of \$24,428.80, or \$880 per acre, which is 55 per cent. of the value of the coal.

Since the mining of coal is purely a business proposition, it becomes necessary for us to be as economical as possible in all departments, and in no other department are the same opportunities offered for the saving of money as in the extraction of our pillar coal.

While the actual work of pillar extraction does not usually begin until several years after a mine has been opened, the real work of pillar extraction should begin, and if the best results are to be obtained must begin, when the first projection for the mine is being made. At

this time it is necessary to consider many things which will later on enter into the successful drawing of the pillars. Among the most important of these are:

1. The nature of the coal. Some coals are of such a nature that the corners and sides of the pillars are apt to chip or split off, thus causing a great waste as well as a weakening of the pillar. This chipping may be caused by the disintegrating influence of the atmosphere, by the pressure of the roof or by gas pressure, or possibly by a combination of all of these. When these conditions have to be met, the pillar must of necessity be made larger than in seams where these conditions are not to be found.

2. Nature of roof and floor. If the roof is hard and the floor is soft, the pillars are likely to be forced into the softer material. If the floor is hard and the roof is soft, the latter is likely to become badly broken. If both roof and floor are hard, the coal in the pillars is likely to become crushed.

#### LARGER PILLARS REQUIRED IN A PITCHING SEAM

3. Inclination. This is one of the most important factors in the projection of a mine and it must be considered before a final decision is made as to the size of pillars that should be provided. Although in pitching seams the amount of pressure on the pillars is less than that in flat seams, due to the fact that the pressure varies inversely as the inclination, yet, other conditions being equal, larger pillars must be left in order to eliminate any danger of a rush or movement of the strata over the pillars when the work of drawing begins.

4. Dislocations or faults. If the area to be mined is badly broken up or faulted, much attention must be paid to this feature in order to remove the danger of squeeze brought about through the excessive pressure caused by dislocated and loosened roof.

5. Depth of seam. The depth of the seam is the measure of pressure which the pillars must bear. The total power of resistance to crushing in any pillar must not only be great enough to sustain the pressure during the first working, but it must have a surplus sufficient to insure the safe, economical and entire extraction of each adjacent pillar in its regular turn. As the depth becomes greater the best practice seems to indicate that pillars should not only be larger, but that the proportion of their widths to their lengths should increase. In case the depth becomes so great that it is impossible to leave pillars of sufficient size to resist the pressure the room-and-pillar system of mining becomes impracticable and must be abandoned.

6. The thickness of the coal seam to be worked. This factor will have an important bearing on the size of the pillars. In a low seam, pillars should be smaller than in a high seam, assuming the depth of cover to be the same in each case.

7. The ventilation required. In case it is known that the seam about to be worked will give off gas in any large quantities, the pillars must be so laid out that the workings may be well ventilated with a minimum of expense. In order to do this, excessively long pillars would be out of the question.

8. Tonnage required. Short pillars usually best enable the operator to obtain a large tonnage from a small area.

9. Direction of pillars. As a general statement it may be said that pillars with their longest sides parallel to the pitch of the seam give the strongest roof support.

10. Direction of butt and face cleats in the coal. It is often desirable to have the rooms, and consequently the pillars, running parallel to the butt cleats and at right angles to the face cleats in the coal. As the butt cleats are not always parallel to the pitch of the seam it is often impossible to drive the rooms on the pitch. The inclination is sometimes so great that the rooms must be driven across the pitch or at right angles to it, in order that the coal may be hauled as cheaply as possible.

11. The detailed method of working adopted. This last factor will to a great extent be governed by a careful study of all the other factors entering into the successful drawing of the pillars, as well as to the many other needs which bear no relation to the drawing of pillars, yet which must be considered in the laying out of a mine.

#### DIVIDING THE ACREAGE INTO SMALLER PANELS

Assuming all else to be equal, the detailed method adopted for working any coal area should be such as to insure the complete recovery of all coal in the tract. Experience has shown that in order to do this, the sooner the pillars are recovered the better, provided that this speedy extraction is consistent with economy. This makes it necessary to subdivide the area to be worked into smaller blocks or panels, each panel to be kept separate, as far as possible, from the panel adjoining it, at least until pillar drawing begins. The size of these panels or blocks will depend upon modifying conditions, but as a general statement it may be said that for economical mining they should not be more than 1,500 to 1,800 ft. in length and in width should not exceed 500 ft.

After considering carefully all the factors just mentioned, the proportion of pillars to openings is fixed, the direction of rooms and pillars has been determined, and we have a definite plan to follow during the development period.

While development work is being carried on it is absolutely necessary that the greatest care be used by those in charge of the operation in order that all entries, crosscuts, rooms, etc., be driven in the proper direction and of uniform width, so that pillars will be left of the proper size.

During the time the first panels are being developed coal is likely to be badly needed, the management will be very desirous of increasing the output, and the temptation will be great to start new places as soon as it is possible to do so, regardless of what the final result may be. If, however, the fact is kept in mind that a high output with a resultant low cost per ton at this time will mean excessively high ton costs later on, rooms will not be turned until the entries have reached their destination, and pillar drawing will commence only when the inside room on the panel has been driven to the boundary.

#### RECTANGULAR PILLARS AND STAGGERED CROSSCUTS

Whenever it is possible to do so, rooms should be driven at right angles to the entries and room crosscuts at right angles to the rooms. This will avoid sharp corners on the pillars, which are likely to become crushed later. The room crosscuts should be staggered; that is, they should not be driven opposite each other. In this manner a line of weakness will be avoided which might develop later while the pillars are being drawn. Timbering in the rooms and room crosscuts should be done in a systematic manner, regardless of whether the roof is apparently good

or bad, the system of timbering and the quantity used depending on the character of the roof. Timber of good quality should be used even though it costs slightly more than the cheaper grades. When poor timber is supplied, the expense of renewing all that is broken after pillar drawing has been started is often great. Track should be laid of sufficiently heavy steel on good substantial ties with all joints fish-plated.

When ready to start the actual work of pillar drawing, the selection of the right man for this work is very important. This is especially true if the mining is to be done by hand. The miners should be selected from the most experienced and most steady men, as the work is at any time likely to become extremely dangerous. The pillar foreman should be a man who thoroughly understands his work and who at all times can enforce strict discipline. He should be a man who can understand a plan or projection and can realize the importance of doing things in a systematic way.

In pillar drawing, as in the development work, it is absolutely necessary that the projection be closely followed. The pillar or breaking line must be kept straight; for if some pillars are allowed to project beyond this line, they are sure to be crushed and bounces are likely to occur, especially where the floor is extremely hard. For best results this line should not be less than 30 deg. nor more than 60 deg. off the line of strike. The order in which pillars are removed is very important. The upper pillars should always be removed first, taking out the next ones lower down in consecutive order.

#### END SLICING VERSUS SPLITTING PILLARS

Pillars may be drawn in several different ways. A common practice is to start at the top crosset and take a skip or slice off the upper end of the pillars, continuing this until the entire pillar has been removed. A still better practice, especially where machines are being used, is to drive a crosset at right angles to the room at a point from 25 to 50 ft. from the end of the pillar; then from this crosset drive a narrow place through the pillar parallel with the room, later removing the two remaining stumps, taking out the inside one first.

This method has several advantages over the skipping or slicing method, chief of which are greater safety to men and material, reduced cost for changing and shifting track, better opportunity for recovery of timber, etc.

Where the roof in rooms has fallen before pillar work commences, which is not likely where the panel system is used, a skip is taken along one side, advancing from the mouth of the room until the top of the pillar is reached, after which either of the plans outlined may be followed.

When a skip is being taken along the end of a pillar or while the pillar is being split, it is necessary that the places be kept well timbered. Posts should be set with a slight inclination against the pitch and should be kept well up to the face. Too great care cannot be exercised by those in charge of pillar work in seeing that all places are properly timbered. As the cost of timber, especially in the Western States, is considerable, all timbering in pillar work should be done with the idea of its possible recovery.

Where the roof is a heavy, massive sandstone, it is a good plan to point the lower end of the props and set them on a sill. As the roof settles and the weight comes

on the prop, this will allow the bottom of the post to broom out and it will settle into the sill, thus preventing the prop from breaking. In this way, under proper conditions, much timber may be saved. Where the roof is made up of soft sandstone or shales this method cannot be followed, as the roof will gradually settle onto the props and finally part from the more solid rock above, at which time the props are likely to break without giving any warning, thus making conditions extremely dangerous.

Props should be drawn as soon as possible after the last stump has been taken from a skip, not only because of the economy in so doing, but in order to allow the place to cave, thus taking the weight off the adjacent pillars. For the safety of the men doing the work all prop pulling should be done with machines.

If success is to be secured in the extraction of pillars, it is very important that no pillars or stumps be left behind the breaking line. If for any reason it is impossible to remove a stump, it should be cut off or shot down before the place is abandoned. This is necessary in order to allow the roof to break along the pillar line, thus taking the weight off the standing pillars. After all timber and stumps have been removed, if the roof still refuses to fall, it may become necessary to shoot it down.

#### HOW TO WORK TWO SUPERIMPOSED COAL BEDS

Where the pillars in but one seam are being drawn, the work is simplified as compared to pillar drawing in two or more contiguous seams, especially when the two seams are close together. Where the interval between two such seams is thick, the usual custom is to work the seams independently, the upper seam being worked out first. Where the interval between two seams is thin, it becomes necessary to work them simultaneously. The question as to whether the entries, rooms, crosscuts, etc., in the upper seam should be directly over the entries, rooms, crosscuts, etc., of the seam below or over the pillars is one which is open to discussion, although the decision for any particular case will no doubt depend on natural conditions, such as thickness of the interval between the seams, nature of interval, thickness of cover, etc.

To draw the pillars in two such seams successfully, getting a high percentage of recovery in each, it will be necessary that all those in charge of the work exercise sound judgment and much care. The pillar line in the upper seam should be kept slightly in advance of the work in the lower seam, the distance it is kept in advance depending on the width of ground broken with each fall; that is, the top seam workings should at all times be one fall in advance of those in the lower seam.

#### CAVING SYSTEM TO BE AVOIDED IF POSSIBLE

Where the strata between two seams are very thin, 2 to 5 ft., the caving system is sometimes used. With this system all workings are in the lower bed, the upper seam being left intact until pillar work has commenced. When about to make a fall in the lower seam, holes are drilled through the parting rock to the bottom of the upper seam. After all stumps have been removed, the timbers are pulled and the parting rock is shot down, posts are then set on top of this rock to support the upper seam, track is laid on top of the fall and the top coal is shot down and loaded out.

The success or failure of this system of mining will depend almost entirely on the nature of the roof overlying the upper seam. If this roof happens to be a massive sandstone which will hold up for a short period of time, a large percentage of the top seam may be recovered. Should this roof happen to be a slate or shale, it is likely to break and fall on the top coal, thus making the percentage of recovery small. Another feature upon which the percentage of recovery will largely depend will be the size of the falls made in the lower seam. The smaller the area caved at any one time the greater are the chances of getting the top seam before the strata above it cave.

This method of mining is uncertain and extremely dangerous and should only be used when it becomes impossible to secure the coal in any other way.

The dangers to life and property in connection with pillar drawing are many and varied. This is especially true if improper methods are used. Men are likely to be injured by falls of roof or coal or by bumps or bounces. Rails, timber, wire, pipe and materials of all kinds are likely to be buried under caves. Large areas of valuable coal are likely to be lost should a squeeze or creep come on.

To properly protect the men engaged in pillar work the pillar foreman should visit all working places at least twice each day and oftener if possible. The mine foreman should visit these places at least once each day if it is in any way feasible for him to do so. The mine superintendent should keep a careful check on all that is being done in the pillar workings. If at any time these men find a condition that they think is dangerous, this condition should be corrected at once or the men should be withdrawn from that part of the mine.

To properly protect material a careful check should be kept on this item by all in authority. Material should never be allowed to lie behind the breakline, as a cave may occur at any time. Track should never be allowed to remain over night in a place which is likely to cave before morning.

#### BY PROPER METHODS BOUNCES MAY BE AVOIDED

Pillar workings can best be protected against bounces, creep, squeezes, etc., by proper methods of drawing. Bounces are not likely to occur if a breakline has once been established and if no pillars are allowed to extend beyond this line. In case proper pillars are left during the development of a mine and these pillars are drawn by proper methods, there is little danger of a squeeze or creep. Should a squeeze appear in pillar workings, it will be found extremely hard to stop. The only plan which can be followed in cases of this kind is to reinforce the pillars as much as possible by building wooden cribs or rock walls, pulling the pillars as rapidly as possible, thus relieving the weight from the pillars adjacent to the affected territory.

In cases where the action of the squeeze is very rapid it may be impossible to draw any of the pillars before the territory is completely closed. In cases of this kind the only thing that can be done is to abandon the affected territory until all excavations are completely closed by the squeeze; then if the amount of coal to be recovered will justify the expense, the territory may be reopened by taking up bottom or taking down top or by taking a skip off the pillars. This work is always very expensive, and it is only in a few cases that it has proved satisfactory.

## Structural Features of a Coal-Screening Plant

*SYNOPSIS—Convenience and adaptability to the purpose in hand are considerations which should govern the design of screening structures. Many elements, such as machinery supports, require special attention, while walks, platforms and stairways should all be carefully designed.*

The general lines of a screening structure should be dictated by convenience and by adaptation to its uses. Thus it is desirable to avoid columns between tracks, to leave convenient openings for walks, platforms and stairways, to allow free access on one side at least to the hoisting shaft (at shaft mines) and to support all machinery parts in a manner most appropriate to the machinery itself.

A design worked out on these lines will never be especially economical structurally—that is to say, it is always possible to save metal by neglecting considerations of convenience—but on the other hand, the structure must be looked upon as subordinate to the general uses to which it is to be put, and it is hard to estimate the money losses from years of operation of a structure in which convenience has not been considered.

Each operation of maintenance and repair may through faulty design easily require double the time that would otherwise be necessary, and the little advantage in first cost is nothing in comparison. This is especially true in steel or concrete, where changes are difficult to make.

Columns between the tracks lead to accident and injury to men; likewise close spacing of tracks. The screen structure should at least span two tracks, and the tracks themselves should never be less than 15 ft. apart.

Bins should be used for storing small coal only, as there is too much breakage in storing sizes larger than No. 1 nut. Bins for commercial coal should be preferably set over the loading tracks so they can load out completely on one track. They may be provided with discharge chutes if desired, at higher elevations, for the adjoining tracks. They should preferably be of circular form and have conical bottoms so they will clean themselves and load out with minimum breakage. They should have either undercut or rack-and-pinion slide gates.

### WIDE PASSAGEWAYS ARE UNNECESSARY

Walks and stairways need never be wide. Two feet six inches is wide enough for almost any of them; but the railings should be placed at a convenient height, and the passageways themselves should be of a construction that will not become slippery or collect ice and snow. Rectangular bars placed on edge make the best stairways. Outside walks should be either made of steel grating or thick timber and interior platforms or walkways either of timber or concrete.

All railings should be arranged with a foot guard to prevent one slipping underneath and so that bolts or tools cannot be easily shoved off the edge. The top rail of stairways should be of pipe about 1½ in. in diameter, while platform railings can be of angles. When platforms

or stairways go through the structure, full headroom should be allowed. It is easy to step over a brace if necessary, but it is also easy to be hit overhead if the vertical headroom is not sufficient. Therefore if the proper clearance has to be decreased for any structural reason, it is far better to infringe on the bottom than on the top.

Stairways should be used in preference to ladders, as it is usually necessary to occasionally carry heavy tools, machine elements, etc., up into various parts of the tipple. Even a steep stair with a railing is greatly to be preferred to a ladder.

Walks and stairs should be arranged to give easy access to all machinery that needs attention, and this means practically every machinery part.

In shaft mines the shaft opening should be clear on one side at least to permit the ready removal or replacement of a cage or the lowering of rails or other supplies needed underground.

### SLIDING BASES FOR MOTORS

Machinery supports should be convenient and strong. Motors should be set on wood, and sliding bases should generally be used, whether the motors are belted or geared. This is to allow ready adjustment of alignment or the substitution of different rigid pinions or pulleys in case it is desired to modify the speed ratio between driving and driven shafts.

Supports for machinery should be rugged and should be well braced against twisting or rotary vibration. It is well to remember that the structure is going to vibrate in the direction of the vibratory forces. A little unbalanced load is sufficient to cause such vibrations, and no screening mechanism is so perfectly balanced under all conditions as to be immune.

It is not wise to attempt to make the screen drive support too rigid; it is far better to allow a little local vibration. Members immediately supporting the screen, if this is done, will cushion and protect the main elements of the structure. This should not be accomplished by making the parts weak, but by proper arrangement, so that the stresses will travel indirectly into the main members.

No floor should be designed for less than 100 lb. per ft. of live load, and a greater load should be provided for where it is likely that coal or refuse may be piled up or stored during operation. The roof need not be figured for over 30 lb. external load. The weight of all machinery parts should be carefully calculated and the resultant stresses doubled to provide for impact. Wherever the stresses are pulsating or reversing, it is good practice to multiply them by four instead of two. This applies to members supporting shaker screens and resisting the forces from the driving rods.

All extraordinary stresses that may be produced by mishandling of the machinery must be provided for to the extent that no serious damage can be done to the structure by such manipulation. The total maximum strength should be calculated and the unit stress not allowed to exceed about two-thirds of the elastic limit.

On the foregoing basis it is safe to use a unit stress of 16,000 lb. for members in tension and 12,000 lb. for rivets. Compression members should be designed for the same axial stress reduced for slenderness, and the compression unit stress should not exceed 12,500 lb. for normal loads.

The slenderness of all members, in either tension or compression, should be limited. No column should have a length ratio  $\frac{l}{r}$ , where  $l$  is the length of the member in inches and  $r$  is the radius of gyration of its cross-section in inches) exceeding 120, no minor strut over 110 and no tension member over 160. There are cases when it is allowable to use tension members of less stiffness by giving them a strong initial tension, but the practice is not nearly so good as to make them stiff without regard to initial stress.

The metal of the structural frame should be comparatively thick. One-quarter inch should be the minimum except for purlins and girts,  $\frac{5}{8}$  in. for main members and  $\frac{3}{8}$  in. where the metal is exposed to corroding gases.

Many tipplers are field bolted either wholly or in part, but this is not good practice except where the structure is short-lived and is designed to be taken down and moved. In this case a considerable excess of bolts should be used. The best practice is to rivet all important connections, practically everything except purlins and girts, and the extra cost thus incurred is amply compensated by the greater rigidity of the structure.

The selection of the proper covering for a tippler is a hard problem. For want of a better material at reasonable cost, it is common practice to cover a tippler structure

with corrugated iron or steel, preferably galvanized. Such a covering is light, easily applied and lasts from 4 to 10 years. Where the life of the mine is sufficient to warrant it, the siding may be made of cement fabric of some kind and the roof either of cement tile, corrugated asbestos or cement-coated fabric with composition covering.

### Recent Legal Decisions

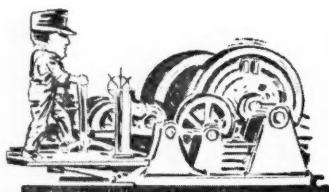
**Effect of Mistake as to Law on Contract**—A coal-mine lessee will not be permitted to escape liability under the terms of his lease on the ground that he made a mistake as to some point of law in executing it. (Pennsylvania Supreme Court, Clark vs. Lehigh & Wilkesbarre Coal Co., 95 Atlantic Reporter, 462.)

**Shipper's Liability for Freight and Demurrage Charges**—In the absence of release of a shipper from such liability, a railway company is entitled to recover from him freight and demurrage charges on the consignee's refusal to accept delivery and to pay such charges. If the carrier exercises its right to sell the freight to enforce its lien on account of the charges and a balance remains due after such sale, the shipper may be held for it. (Georgia Court of Appeals, Western & Atlantic Ry. Co. vs. Bewley-Darst Coal Co., 87 Southeastern Reporter, 702.)

**Services Volunteered by Miner**—A miner arriving at the time and place when and where he was to commence work, as directed by the mine foreman, found that the room where he was to work was not ready, track then being laid. While voluntarily assisting in laying the track he was injured by a blast from an adjoining room that blew through the partition. Held, that he was not prevented from recovering damages against the operator on the theory that since he had not commenced his contract work he was not entitled to the benefit of the rule which requires an operator to provide a reasonably safe place of work for his employees. (Kentucky Court of Appeals, Moses vs. Proctor Coal Co., 179 Southwestern Reporter, 1043.)

## The Song of the Cage

By BERTON BRALEY



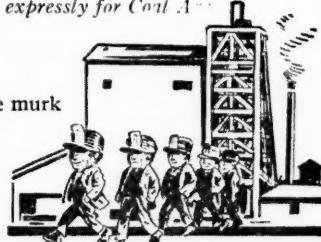
I'm the plaything of that blooming Engineer

Oh, I drop 'em in the morning to their work  
As I rattle, rattle gayly down the hole  
Through the moisture and the darkness and the murk  
To the level where they burrow for the coal.  
Then I yank the cars they fill me to the top  
And I start 'em toward the breaker and its crew;  
And I'm busy till the whistle blows to stop,  
And I hoist the tired miners when they're through.

Oh, I have my ups and downs beyond a doubt  
Like a ball a kid is bouncing on a string;  
I am jerked and rattled carelessly about  
And they hardly let me rest for anything.  
I'm the plaything of that blooming engineer  
As he winds my greasy cable on a drum,  
And I guess the rate I travel makes it clear  
That he likes to keep his engine going some.

Oh, I like to bring my miners safe and sound  
To the sunshine and the daylight overhead;  
But—there's danger in the workings underground,  
And I sometimes travel slowly—with my dead.

Written expressly for Coal Age



To the Sunshine and the Daylight Overhead.

And I take the rescue workers, cool and brave,  
As they risk their lives to save their fellowmen;  
And—I sometimes hoist the comrades that they save,  
And—I sometimes bring their corpses up again.

I have carried laughing wop and sullen Finn,  
I have carried harried supers up and down,  
I have borne the youthful trapper with his grin  
And the owner with his proud and haughty frown.  
I have lowered tool and timber, drill and pump,  
I have borne his wriggling muleship through the murk,  
And I reckon, twixt the collar and the sump,  
That I do my proper portion of the work!

## The Labor Situation

**SYNOPSIS**—The anthracite operators and miners agree not to make statements to the public for fear of muddling the issue with technical questions. The meeting of the policy committee of the United Mine Workers at Pittsburgh, Penn., causes an eighth adjournment of their session with the anthracite operators. The policy committee ratified on Mar. 16 the agreement made between the coal operators of western Pennsylvania, Ohio, Indiana and Illinois and the United Mine Workers of America.

At the continued session of the subscale committee of the anthracite operators and miners held at the Union League Club, New York City, on Wednesday, Mar. 15, consideration was given to demand No. 5 requesting a more speedy and satisfactory method of adjusting disputes. The records of the board of conciliation, which were submitted, showed that 194 cases were considered by the board during the past four years, of which 133 were adjusted by it and 61 were referred to the umpire.

The miners suggested at the conference that three boards be formed, one for each of the anthracite districts, but the operators objected to this arrangement on the ground that there would be a conflict between the decisions rendered in different parts of the anthracite region. Then the miners argued for the appointment of a permanent umpire to sit with the board in the hearing of cases. The operators' representatives opposed this scheme, holding that such a plan would destroy the purposes of the board of conciliation and make the umpire the sole court for the hard-coal region. The miners also complained of the delay incident to the present system of arbitration, and the operators stated they would favor any reasonable plan for speeding the work of adjusting disputes.

### Ask That Mining Supplies Be Sold at Cost

Then demand No. 7, asking that the selling price of mining supplies be fixed on a more uniform and equitable basis, was considered. The mine workers said there was a wide difference in the selling price of mining supplies throughout the region and urged that the cost of such supplies be ascertained and that they be sold to the miners at cost or at least at no more than a reasonable profit.

Before leaving for Pittsburgh to attend a meeting of the policy board of the union, President White issued a statement in which he said:

"Our conference with the anthracite operators has been friendly, and thus far they have manifested a disposition to be reasonably fair. I am well satisfied with the progress of the negotiations so far, and believe we shall get a favorable agreement."

"Both sides, in order to avoid confusing the public mind over technical terms, have agreed not to argue their case in the newspapers. This agreement was made at the request of the operators. Consequently we have refrained from giving to the public any of the great mass of information in our possession bearing on the fairness of our demands, and on their side the operators, too, have refrained from public discussion since the conference began."

### White Repents Rise Must Come from Profits

"But certain newspapers in reporting the negotiations have reiterated time and again, without any occasion for doing so, that the wage increase we are asking would take \$23,000,000 out of the pockets of the people here in New York and elsewhere who use anthracite coal. I want to protest against the constant repetition of these statements. The miners know they are not true, and the object of repeatedly publishing them can only be to attempt to prejudice the public against the claims of men who are trying to better their condition."

"I could cite facts and figures at great length to prove that both the anthracite operators and the railroads are earning large profits. Statements filed by the operators themselves with the Interstate Commerce Commission in their capacity as owners of the anthracite railroads, in the anthracite rate case decided in the past year, show that the anthracite-producing industry is on a highly profitable basis, and the facts prove conclusively that wages can be increased without inflicting hardship on the coal-using public."

As the public is the party that should and doubtless will pay the bill it is only right that they should know all the details of the settlement. The discussions should be held in the open and not behind closed doors. The anthracite operators have suffered enough in the past by their secret-closet methods, and every time they hide anything the public concludes that it is a skeleton they have in the closet. They are learning to gage the public sentiment with greater accuracy, but there is still much to be learned.

Secrecy in the conference chamber is a mistake. The mysterious guards at the doors should be abolished and the meeting thrown wide open to the press. Some reports unfavorable to the operators would be spread, just as there are now, but the arguments of the coal men would receive due consideration, at least in some papers. As it is now, the anthracite operators are keeping silent and a campaign of misrepresentation is waged against them. This is made easier by the fact that the truth is carefully disguised. The reporter who is misguided is just as much to be feared as one who is purposely trying to mislead.

### Anthracite Wage Conference Reassembles

The subcommittees met after their eighth adjournment on Mar. 21 at 1 p.m., and not on Mar. 20, the day originally set for their reassembling. At the close of the day's conference it was announced by the miners that President White would, within the next two days, notify the anthracite mine workers to remain at work after Apr. 1, even if the negotiations for a new working agreement might not by that time have been completed. This is in accord with the nonsuspension resolution adopted by the United Mine Workers at their convention in Indianapolis. The miners' representatives declare that should an agreement be reached quickly it would be impossible to hold a convention of the miners of the three anthracite districts before Apr. 1. For this reason the contract could not possibly be ratified by that time.

Consideration was given by the committeemen to demand No. 7, relating to mining supplies. This is the demand that was under discussion when the adjournment was taken on Mar. 15. President White outlined the plan of selling powder and mining supplies in practice in the bituminous fields. The use of permissible powder was discussed, the mine workers claiming that the cost of this explosive placed a burden upon them for which they should be compensated by an additional tonnage rate.

### Miners Want Pay for Rock as Well as Coal

Demand No. 8 was next presented by the miners. It asks that, where coal is now mined by the car, it shall be weighed and paid for on a mine-run basis by the ton of 2,240 lb. and that all refuse cleaned from the coal (either gobbed or loaded) shall be paid for at a rate at least as large as that paid for the coal mined. The miners argued that the present system of payment, which is based on a car of given size, is unsatisfactory and that the method of payment for rock and other impurities in the veins by specific allowances was not fair to the miners.

The operators' representatives contended that in fixing prices for car work the character of the vein determined the price per car and where unusual conditions are met allowances are made to the miners sufficient to cover the difficulties encountered in mining. There was a lengthy discussion regarding this demand.

The last subject presented by the miners in the session was demand No. 9, in which the mine workers ask for a readjustment of the machine-mining scale. President Dempsey, of District No. 1, in which district machine mining has been introduced, made the principal argument for granting the demand. This was still under discussion when adjournment was taken for the day.

Later it was learned that the miners were willing to have machine-mining conditions referred to the individual mining committees and the mine managers for adjustment and that such a proposition would probably be submitted to the operators' representatives for consideration.

The joint subcommittee received a communication from various civic and commercial organizations in the Lackawanna and Wyoming Valleys asking that the agreement be made operative for a long term. The secretary was instructed to reply that the request would be given consideration.

### Scranton Union Asks Congressional Inquiry

At a meeting of the Scranton Central Labor Union a resolution was introduced by President S. J. McDonald, asking Congressman John R. Farr, representing the Lackawanna district at Washington, to induce Congress to conduct an in-

vestigation into the cost of mining and marketing anthracite. The resolution stated that while it costs \$1.50 to produce a ton of coal, the companies retailing the product charge \$7.50 at points only 150 mi. from the mines, while right in the mining towns it is retailed for \$4.75.

The resolution was the result of the statement by the mining companies that it would be necessary to add 60c. a ton to the retail price if the miners' demands for an increase in wages were granted. After an address by James Maurer, former Socialist member of the legislature and also now president of the Pennsylvania Federation of Labor, the resolution was unanimously adopted.

#### **Policy Board Accepts Interstate Contract**

The agreement between miners and operators in western Pennsylvania, Ohio, Indiana and Illinois has to submit to the many checks and balances imposed on its acceptance by the union. First the subcommittees of the miners and operators had to agree on the provisions, then the scale committees had to review the terms, and now the policy committee of the miners has had to give it its consideration. Now that they have approved it, there is still the referendum vote of the men. The solidarity of the union is well proved by the ease with which so many hurdles are met and taken without mishap. The agreement was ratified at Pittsburgh on Mar. 16.

Mr. White declared that he hoped to equalize the machine differential in Indiana and Illinois in a future agreement, though this year not much had been done in that direction. He appeared to expect trouble in Indiana as a result of his signature to the agreement on behalf of the Indiana miners, and he said that "representatives of the international organization" would appear before them and endeavor to explain the position of the union leaders.

#### **Full Text of Scale Committee Agreement**

It will be well here to give the full text of the agreement thus ratified:

The following agreement is made and entered into this Mar. 9, 1916, covering prices and conditions of mining in western Pennsylvania, Ohio, Indiana and Illinois for the two years beginning Apr. 1, 1916, and ending Mar. 31, 1918, to wit:

1. All coal shall be weighed and paid for on a mine-run basis, but the block district of Indiana shall continue upon the present screen-coal basis and the pick-mining rate thereon shall be advanced 5c. per ton and machine mining 4c. per ton.

2. The pick-mining rate in the thin-vein district of western Pennsylvania shall be 67.64c. per ton, and in the eastern Ohio, Hocking, Cambridge and Amsterdam-Bergholz districts of Ohio the mining rate shall be 67.64c. per ton, while throughout the balance of Ohio the pick-mining rate shall be advanced 3c. per ton, unless the joint conference of operators and miners in any of the subdistricts or scale districts within the state otherwise agrees. In the bituminous districts of Indiana and in the Danville district of Illinois the pick-mining rate shall be 64c. per ton.

3. The machine-mining rate in the thin-vein district of western Pennsylvania shall be 50c. per ton and in Ohio the same. In the bituminous district of Indiana the chain-machine mining rate shall be 52c. per ton, and the rate for coal undermined by punching machines shall be 54c. per ton. In the Danville district of Illinois the rate shall be 54c. per ton.

4. All day labor, deadwork, yardage and room turning shall be advanced 5 per cent. on existing prices.

5. An 8-hr. day means 8 hr. work in the mine at the usual working places for all classes of inside day labor. This shall be exclusive of the time expended in reaching such working places in the morning and departing from the same at night. Drivers shall take their mules to and from the stables, and the time occupied in so doing shall not be included as any part of the day's labor, their work beginning when they reach the change at which they receive empty cars, but in no case shall the driver's time be docked while he is waiting for such cars at the points named.

6. All internal differences are hereby referred to the various districts for settlement with the understanding that only by mutual consent shall anything be done in subdistrict, district or wage-scale conventions that will increase the cost of production or decrease the earning capacity of the men. All rules now incorporated in existing contracts shall remain in force unless changed by agreement between operators and miners' representatives.

7. All district organizations herein represented shall take up the preparation of coal and adopt such rules and regulations with proper penalties as will best suit the conditions of each district herein represented.

8. A joint commission of three miners and three operators shall be appointed by the Illinois miners' and operators' associations, and this commission is hereby given authority to establish the proper machine-mining rates in the longwall mines of northern Illinois without regard to existing machine differentials.

9. An interstate joint conference shall be held prior to Apr. 1, 1918; the time and place of holding such meeting shall be referred to a committee of two operators and two miners from each state herein represented, together with the international officers of the United Mine Workers' organization.

The signers of the United Mine Workers of America were: Van Bittner and P. P. Hanaway for western Pennsylvania; John Moore and G. W. Savage for Ohio; John P. White, Frank J. Hayes and William Green for the "bituminous" district of Indiana; Lawrence Bramlett and Ed Haverkamp for the "block" district of the same state; Frank Farrington and

Frank Hefferley for Illinois. The international officers, John P. White, Frank J. Hayes and William Green, signed not only for the Indiana "bituminous" mine workers, but also as president and secretary-treasurer of the United Mine Workers of America. Charles Albasin, the president of subdistrict No. 6 in eastern Ohio, did not sign the document, but returned home, as did also Adolph Germer, of Illinois.

The operators who signed were: J. A. Donaldson and George Schleuderberg for western Pennsylvania; S. H. Robbins and C. E. Maurer for Ohio; P. H. Penna and M. L. Gould for the Indiana Bituminous Coal Operators' Association; William M. Zeller for the Indiana "block" district; C. M. Modewell and H. C. Perry for Illinois. J. C. Kolsen signed as chairman, while William Green, as secretary of the joint conference, placed his signature for the third time on the document.

#### **Intention of the Sunday Creek Coal Co.**

The intention of the Sunday Creek Coal Co. in southern Ohio is in doubt. In fact, the company has probably not made up its mind definitely as to the right course of action. It desires to operate under a far lower scale than appears to be about to be signed up, and it hopes to get a lower rate to the Lakes as a result of the suit now pending before the State Utilities Commission.

But if it cannot get a lowered wage or a reduced freight rate it will probably leave its Ohio mines idle and develop the 45,000 acres of coal it holds in Virginia. This latter it will not do, without a preliminary effort to lower costs of production and transportation in the field in which it has always been a dominant factor—the Hocking Valley region.

The Sunday Creek Coal Co. has too much at stake in Ohio to willingly close down its operations in that state. It controls seven mines, which are the most modern and most valuable of its former holdings. Leaders among these are the two mines at San Toy, each of which can mine 1,200 tons a day, and in which the most modern equipment has lately been installed.

Besides these mines on the Baltimore & Ohio R.R., there are three on the Hocking Valley Ry., one on the Toledo & Ohio Central Ry. and one on the Zanesville & Western Ry. What is of more importance to the future of the company is the 45,000 acres of good, untouched Hocking Valley coal lands which it owns in fee simple. The sites of 12 large modern mines have been located on this acreage by the company's engineers, and development will be pushed as soon as labor and freight-rate conditions justify it.

N. D. Monsarrat, who has taken charge of the properties of the Continental Coal Co., recently recovered by the bondholders from the Sunday Creek Coal Co., will not make a statement as to the future. He claims that plans have not yet been worked out. It is uncertain whether the mines will be operated during the present season.

#### **I. W. W. Strikers Lose Their Bitter Fight**

The Industrial Workers of the World at Greenwood colliery of the Delaware and Hudson Co. have returned to work after weeks of idleness and some violence. Frank Lacka on his way to work was fired at, and as a result Thomas Lechinsky was arrested and detained under \$500 bail. According to Lacka's own story a bullet passed through his coat and another through his dinner bucket, but he was not injured. A locomotive was dynamited by an explosive placed on the rail, but no damage was done.

Superintendent Lovering refused to discuss grievances with any one but employees, saying he did not regard anyone as an employee who was on strike in violation of the agreement which is in force till Apr. 1 of this year. The miners claimed that after they had paid their laborers \$2.12 per day they do not have the \$2.72 which is the regular day wage of company miners.

Superintendent Lovering has promised to give work to all who return to the mines and has agreed not to discharge any of them. There is much bitterness as the result of the strike. The United Mine Workers would like to see the I. W. W. men discharged for threatening and maltreating the union men who refused to strike. The I. W. W. members are incensed at the United Mine Workers because they continued at work or tried to do so and because they urged that they could not strike under any conditions, being bound by the contract still in force. The laborers at the Lingcliff colliery at Avoca were disposed to come out on a strike also, alleging that the rate of \$2.12 per day paid them by the miners was about to be commuted to 65c. a car.

Differences between workingmen are to be anticipated and they are not by any means more discreditable than disagreements and jangles between employers. But at the same time they forewarn the employee of the great danger he is in if he advocates legislation whereby the enforcement of the law is made so weak that it can do nothing in his defense.

## Consumers Want Wilson To Probe Cost of Coal

A committee representing the Real Estate Board of New York and the New York Building Managers' Association has appealed to President Wilson asking him to appoint a commission that will make a full inquiry into the coal situation and ascertain the methods adopted for the distributing and marketing of coal and determine what is the ultimate cost of coal to the consumer. The committee has sent letters to the presidents of over 250 civic and commercial organizations in the cities in which similar conditions to those in New York City exist and asked them to give their prompt support to the movement. The letter to the President declares:

This is a situation which needs united and prompt action to secure results. Whether the miners strike or not and obtain an increased wage, for which in the final settlement the consumer will pay, we believe the situation should be promptly investigated to ascertain if coal is delivered to the consumer at a reasonable margin of profit to the following units: Miners, operators, transportation companies and local dealers. If it is found that any of these units are receiving an unfair return, we respectfully request that action be taken to adjust the same at once. It is rumored that the anthracite operators expect to change the sizes of coal delivered. We also believe that the efficiency of this change, as relates to the consumer, should be investigated. Whether or not a strike occurs it would be an easy matter for the operators to settle the wage question with the miners and make the consumers pay for the adjustment.

During the strike of 1912 [?] the commission appointed by the President of the United States was successful in bringing the operators and miners into an agreement which expires on Apr. 1, 1916. It is therefore respectfully submitted that a similar commission should be appointed immediately and a thorough investigation made with the object of preventing a strike and securing, if possible, the delivery of coal on an equitable basis.

As the President took no action toward the formulation of the anthracite scale of 1912, it must be supposed that the petitioners have reference to that of 1902. It is of course not necessary to tell coal men that the agreement which expires on Apr. 1 is not the same which was signed in 1902, though it is based on that instrument. Industrial peace, moreover, has not been unbroken since that time, though the letter would cause one to infer that such a beneficent result was secured, nor is it true that the scale has been maintained unchanged.

## New York Central Embargoes Against New England

The New York Central, on Mar. 20, placed the following embargoes in effect on bituminous and anthracite coal to local and New England points:

- To New York, New Haven & Hartford R.R. (including Central New England Ry.) points, via Beacon, N. Y., except when consigned to hospitals, asylums and schools or public utilities, including water, gas, electric light and street railway companies, but not for reconsigning or reshipping.

- To points on the New York, New Haven & Hartford R.R. and the Central New England Ry., via all junctions, except when consigned to hospitals, asylums and schools or public utilities, including water, gas, electric light and street railway companies, or for N. Y., N. H. & H. R.R. and C. N. E. Ry. fuel supply, but not for reconsigning or reshipping.

- To points on or via the Boston & Maine R.R., via Rotterdam Junction, Troy or Schenectady-Mechanicsville, except when for Boston & Maine R.R. or Rutland R.R. fuel supply or for the United States Government.

- To points on or via Boston & Albany R.R., via West Albany, Rensselaer or Hudson, except when for B. & A. R.R. or N. Y., N. H. & H. R.R. fuel supply or for the Government, or for points on or via the N. Y. C. R.R. moving via B. & A. and Chatham or when moving to Hudson Upper via Hudson.

- To points on or via the Ontario division (east of Rochester or Charlotte), the St. Lawrence division and the Adirondack division of the N. Y. C. R.R. Co.

- When sent for reconsignment to Mechanicville, N. Y. (via Schenectady and Delaware & Hudson Co.), Rensselaer, Rotterdam Junction, Syracuse, Troy, West Albany and West Albany transfer.

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## Did Not Buy a Return Ticket

James A. Haislip, superintendent of the Rosemont Coal Co., Rosemont, W. Va., declares that some men who buy tickets to "take a trip" should take the trouble to secure means of returning, because the new location may not please them. He shows incidentally that the miners who leave West Virginia, with its temperance laws and wage scale, really find it is not a bad state to work in after all—a statement borne out by actual statistics of average annual earnings, by the way. Mr. Haislip exhibits this letter:

Ef uplees Measter Heizilm sand mi paea too dees pleis. Adamsburg, Pa., radovei bi — i eme brock i gate later from fele eevaz astenua mi paea en ou voodno vene geeb toom now plees I astenue ford mi sellf Ely Ronny and hee seis ine leder tooou vant mee too skom beck i vood skom beck if i god moni bot i en godno dogon peni noua i nide moni afe bad Santmee moni radovei oobje please and good bi. Mi Atres Ely Ronny Adamzburg Pa. West Morland Co.

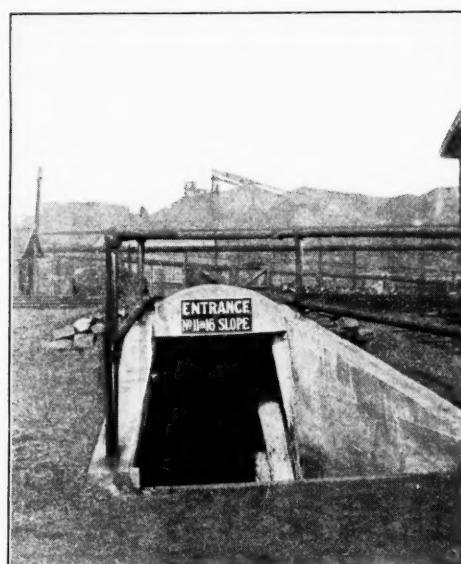
The interpretation is as follows:

If you please, Mr. Hezum, send my pay to this place, Adamsburg, Penn., right away. By — I am broke. I got letter from fellow. He was asking you my pay and you would not want give to him. Now please I asking you for myself, Ely Ronny. And he say in letter, too, you want me to come back. I would come back if I got money, but I ain't got no dog-gone penny. Now I need money awful bad. Send me money right away. Oblige please and goodby. My address, Ely Ronny, Adamsburg, Penn., Westmoreland County.

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## Safety Subway

The illustration shows what appears to be one of the ordinary slope entrances in the anthracite district. In reality it is a safety subway by which men pass under railroad tracks and thus are not exposed to danger. It



SUBWAY AT BEAVER BROOK COLLERY

is at the Beaver Brook colliery of Weston Dodson & Co., Inc., near Hazleton. Improvements of this character indicate plainly the new interest employers are taking in anything which will promote the safety of their men.

## Editorials

### Alabama Machine Records

A statistician, though he rarely looks the part, is a bold, bad fellow who ruthlessly with blood and iron sweeps away every consideration but those he favors, and draws his deductions right or wrong, salving his pliant conscience perhaps with the statement that his conclusions are true, other things being equal, which indeed is not a usual quality of things in general.

This "ceteris paribus" reservation, a recognized refuge of lies, might well be pasted over much of the product of expert "figgerers," and when *Coal Age* takes up the trade of the statistician it is well to remember that it is exposed to all the temptations of the profession. As a first assumption it is going to allege that the productions per man in American mines are modified solely by the use of cutting machines. Samuel Dean will probably take exception being committed to an advocacy of large cars or possibly more truly of large equipment.

But with the arrogance of a statistician *Coal Age* passes on regardless of the importance of the car-size question and will group it among those many and really important "ceteris paribus" conditions which the statistical expert is permitted to overlook.

In 1910, 41.7 per cent. of all the coal produced in the United States was mined by machine, and the output per man per day was 3.46 tons. In 1914, 51.7 per cent. of the coal was the product of machines, and the output per man per day was 3.71 tons.

A little excursion into the simultaneous equations which plagued our youth will show that if the output is a function of the method of mining and of it only—as we have boldly pretended to assume—then the machine-mine output per man is 2.11 times as large as the product per man of the mine where coal is dug with the aid of mere muscle and powder.

But Alabama has for such considerations an unhealthy jolt. In 1910 that state mined 18.5 per cent. of its coal by machinery, and its output per man per day was 2.91 tons. In 1914 it mined 31.7 per cent. with the aid of machines, and the daily product of the average man had dropped, not risen, to 2.87 tons—an increase in percentage of coal mined by machine of 71.3 per cent. and a decrease in output per man per working day of 1.38 per cent.

Laboriously equating, multiplying and eliminating, the result is obtained that the machine mine in Alabama was only 90.3 per cent. as efficient as the mine where coal was obtained by muscle and powder—truly an odd result.

Too often it is to be feared that operators do not realize that machines need expert care and that machine work requires diligent planning. With all division of labor there must be time study and much superintendence. Without these there is inevitable confusion. Unless the operator when he installs machines is willing to watch them and their operatives closely the tonnage of the men may fall below what would have been obtained had machines not been purchased. No one is more surprised than he, for he knows a machine can cut far more than two men.

The figures tend to show that, as a whole, in the United States, with all the errors of management exhibited in their handling, machines are increasing the tonnage per man roughly 111 per cent., but there are exceptions. No operator is justified in asking his men to accept the lowered rate per ton paid for machine work unless he is ready to keep his machines in such working order and his systems in such trim that the miner can make at least as much after the installation of mechanical cutting as before.

In fact, not only is the miner injured, but the net output being considerably reduced by the necessary consumption of fuel in the manufacture of power, the operator does the public an injustice when he lets a machine mine slide into inefficiency of this sort.

That this is perhaps not uncommon the following quotation from the United States Geological Survey report of 1913 will show:

In Alabama the quantity of coal mined by machines increased from 3,742,549 tons in 1912 to 4,124,301 tons in 1913, but the average production per man per day decreased from 2.91 to 2.82 tons. Similarly in Arkansas the production from machine-mined coal increased from 76,611 to 251,105 tons, but the daily output per man decreased from 2.95 to 2.76. The same condition is noted in Michigan, Montana, New Mexico, North Dakota, Pennsylvania (bituminous coal), Tennessee, Utah, Virginia, Washington and Wyoming. In fact, in the majority of the states in 1913 the average tonnage per day was less than it was in 1912.

The argument, it is true, is not perfect. Merely because a state increases its output of machine-mined coal is not a reason for expecting an increase in output per man. This increased output per mine worker can only be expected if there is an advance, not merely in the production of machine-mined coal, but also in the percentage which it bears to the whole output as mined by all methods.

Thus Washington is mentioned as a state which increased its output of machine-mined coal and decreased its tonnage per man, but it is interesting to note that its output was 7.7 per cent. machine-mined in 1912, whereas in 1913 that percentage had fallen to 7.2 per cent. Thus there was not only more machine coal mining, but also a still larger increase in the production of hand-mined fuel. However, in every other case the growth of machine coal was greater than that of the output mined by hand. Consequently the statement of the United States Geological Survey retains almost its full force.

An earlier declaration on the same report and one fully justified by the facts may well be added:

It has already been shown in the discussion of the statistics of the labor employed in coal mines of the United States that there has been in the last 25 years a marked increase in the average production per man in the bituminous coal mines which may be attributed to the increase in the use of mining machines.

And now to enumerate the other things which in the beginning were assumed to be equal; the mathematical jugglery has avoided considering the effect of the longer hauls, increased water handling both in regard to quantity and depth, the relation between a miner's scale and his activity, the exploitation of thinner coal, the change in

personnel of operators and miners and a hundred other causes. These are a few of the considerations, and they make the simultaneous equation a poor rifle for hunting such elusive game. What has mathematics to do with sociology anyhow? And may we ask Mr. Dean if Alabama has become a votary of the British "tub," seeing that its output has decreased as time has progressed?

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### Deficient Mining Laws

How grave a responsibility devolves upon legislators in the enactment of mining laws is altogether too frequently emphasized by the finding in a court of justice that the law is inadequate and futile because of its failure to recognize the actual and true relations of the parties named in the act.

The enactment of a law is a serious matter, the importance of which is often underestimated or not fully appreciated by those responsible for the act. In the hands of a court, a law is an instrument that defines and makes possible the execution of justice, and any inadequacy in its construction renders it useless for the purpose intended. The beneficent purpose of a law is often frustrated because of insufficient knowledge and care in its preparation. The results are often sad and, in many cases, heartrending.

In a discussion on mining laws and legislation in *Coal Age*, some time ago, attention was drawn to the need of a law that would regulate matters relating to interstate mines. This question was first discussed by John Verner, Vol. 7, p. 26, and later by G. N. Lantz, p. 216 of the same volume. The question was referred to again in the general summary of this discussion on page 639 of that volume.

A sad sequel to this particular deficiency in our mining laws is the case of the widow of a miner, Jerome Gooding by name, who was killed recently in a West Virginia mine. All the openings and the offices of the company operating this mine are located in West Virginia, but the workings where Mr. Gooding was killed had been extended beyond the state line into Maryland, making this an interstate mine, for which there is no provision made in the mining laws of either West Virginia or Maryland.

By the decision of the Supreme Court of Appeals, in West Virginia, this widow was refused compensation for the death of her husband, under the compensation act in force in that state, on the ground that the accident occurred outside the state, or beyond the jurisdiction of the court, and the law providing compensation was therefore inoperative.

Another interesting case illustrating the inadequacy of existing mining laws is the one recently dismissed by Judge Strauss in the Luzerne County Court of Pennsylvania. In that case, Richard Jones, a former assistant mine foreman at the Stevens colliery of the Lehigh Valley Coal Co., was charged with having received money from a miner, who took this means of securing for himself a good position in the mine. The anthracite mining laws of Pennsylvania contain an act approved by Governor Hastings, June 15, 1897, which reads as follows:

For the better protection of employees in and about the coal mines, by preventing mine superintendents, mine foremen and assistants from receiving or soliciting any sums of money or other valuable consideration from men while in their employ, and providing a penalty for violation of the same. Sec. 1. Be it enacted, etc., that on and after the passage of this act, any mine superintendent, mine foreman or assistant foreman, or any other person or persons who

shall receive or solicit any sum of money or other valuable consideration from any of his or their employees for the purpose of continuing in his or their employ, or for the purpose of procuring employment, shall be guilty of a misdemeanor, and upon conviction shall be subject to a fine not less than \$50 nor more than \$300 or undergo an imprisonment of not less than six months, or both, at the discretion of the court.

In dismissing this case, the court held that the statute, though having apparently a beneficent purpose, was inefficient by reason of its being so constructed as to afford no means of relief, because the act assumes wrongly that the mine foreman was an employer of the miners working under his charge. The court held that superintendents, foremen and their assistants were all employees of the operator or company, and while the mine foreman unquestionably is in a position to prevent the employment of men in the mine by the company, it still remained a fact that the miner was not in the employ of the mine foreman, which fact left the court no alternative but to dismiss the case against the foreman.

Without suggesting any criticism of the decision of this court, it is plainly evident that here was an instance of the miscarriage of justice through the inadequacy of the law, owing to a lack of knowledge or care in its preparation. *Coal Age* would suggest that the mining laws of the different states are inadequate in many instances and that this condition should receive the careful attention of intelligent mining men and mining organizations, and further, that such men and bodies of men should not fail to call attention to these deficiencies in the law and to provide for their correction. Such inadequate laws as the one quoted should be promptly stricken from the statute books or revised in such a manner as to enable the accomplishment of their purpose.

### Methodical Pillar Drawing

In his article on "Methodical Pillar Drawing" in this issue W. N. Wetzel takes a view of the value of coal lands which will delight the United States Geological Survey and the propagandists of conservation. A happy life we would indeed live if we could accept their conclusions as to the value of coal and other things. As man cannot do without the circumambient air, we might capitalize it at a good figure, and then how amazingly wealthy we could believe ourselves to be! Yes, and how grieved the air owners would feel that the trade winds are blowing hitherward, and that as a result we were always importing large volumes of cheap foreign air.

As a matter of actual fact it is only when coal is sold in small tracts which occupy strategic positions that the price may reach that which Mr. Wetzel quotes—\$3,000 per acre; and then this is only true where the wage scale is low or where the freight rate to the market is moderate, either by reason of low mileage rates or because of that market's propinquity. These advantages are capitalized in the price of the land, which is based, not so much on the value of the mineral, as on its mining and delivering cost. *Coal Age* has frequently objected to estimates based on the nimble dime. There is no reason for the broad assertion that coal is worth 10c. per ton in the hill. Why not two cents or a dollar? If coal land is not worth what it sells for, or if its value is not a function of the profit it can produce, then what is its real value?

It is surely time for us to realize that the value of an article cannot be any more than what someone is willing to pay for it.

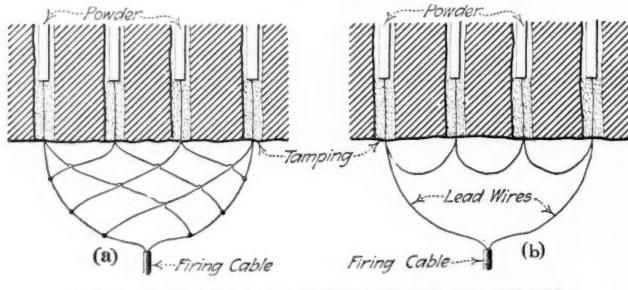
## Discussion by Readers

### Accident in Electric Blasting

*Letter No. 5*—Referring to the accident in electric blasting, an account of which appeared in *Coal Age*, Jan. 29, p. 221, like Mr. Reynolds I feel that it would be impossible for an explosion to take place after the wires are disconnected from the battery.

We must admit that explosions have occurred in the débris resulting from the firing of a number of shots, and after the current had been cut off from the battery. This may be due to carelessness in the handling of the explosive or the tamping of the holes. In the present case dynamite may have been exploded in this way by direct violence or by concussions when the men returned to work and started hammering and breaking up the rocks, as such accidents have happened before. I am inclined to think, however, that the shots were not properly connected up in this instance.

There are two methods of connecting a number of shots to be fired by electricity. The shots may be connected in parallel, as illustrated on the left at *a* in the accompanying figure, or they may be connected in series,



TWO METHODS OF CONNECTING UP SHOTS

as illustrated on the right at *b*. In my opinion it is safer to connect the shots in parallel, because each shot is then fired independently and simultaneously, with the same strength of current. I believe this method offers less risk of misfire than when the shots are connected in series, as the current in the latter case must pass from one hole to the other through the entire series. Since this may result at times in exploding only the first and last holes of the series, I regard the method as unsafe and one that should not be employed.

In my opinion the cause of this accident cannot be attributed to any defect in the detonators used, because all detonators are guaranteed by the manufacturers to stand the test required by the Government Testing Station. I would suggest that greater caution is needed, not only in connecting up the shots for firing, but by allowing more time before going back to work after the blasts are fired. That will give the smoke and the sulphur fumes a chance to clear away and the miner can see better what he is doing and avoid any danger that he might not otherwise discover. My experience has taught me the importance of taking this precaution.

I believe, also, that men are often employed in this work who are not qualified to perform such duties, and

as a result, it is not strange that accidents frequently happen. More caution should be used in appointing men for such service, in order to avoid accidents from this cause.

W. T. M.

Olyphant, Penn.

\* \* \*

### Mining by Concentration Method

*Letter No. 2*—The letter of John Majer, *Coal Age*, Feb. 19, p. 345, contains a suggestion that, under present conditions of labor and the necessity of conservation, should receive the serious consideration of all operators and mine officials.

At the present time there is a great scarcity of coal miners, owing no doubt to the present boom in the coal-mining industry due to the increased activities of associated industries. The reopening of old mines and the establishment of new ones, with the advance in wages made in some regions, have caused a wider distribution of labor, and the majority of mining camps have felt this drain.

Mr. Majer's suggestion that a method should be adopted by which the individual efficiency of those remaining in each camp may be increased to the highest degree is timely and pertinent, especially in view of the fact that this class of labor may not show any numerical increase but rather a decrease in the years to come.

The only way by which this efficiency can be attained is, as Mr. Majer points out, to have the conditions under which labor is performed practicable and make efficiency attainable. This does not mean an increased expense to provide these conditions, but suggests coördinating the various classes of labor and adopting the most practical and scientific methods of performing the work, which must be so concentrated that a less number of men will be required to produce the desired output. This will mean a less expense for day laborers, a decrease in the number of loaders or miners and an increased earning capacity per man per day for the miner, without any advance in the tonnage price of mining.

### CONDITIONS IN THE SOMERSET COUNTY FIELD

To illustrate how this may be accomplished, take a mine in the Somerset County field, opened on the "O" seam, where the coal is an average of  $5\frac{1}{2}$  ft. thick, on the western anticlinal. Here, the "rise headings" of Mr. Majer's sketch can each be made rooms or producing entries, but this would necessitate their being driven at greater distances apart than would otherwise be necessary. It would eliminate the expense of narrowwork. When such a pair of room headings has reached the boundary, enough rooms can be started in succession to work 20 loaders.

Two men can work in a 24-ft. room, and a 5-ft. machine-cut would enable the two men to load 20 tons of coal per day. A single Sullivan short or longwall ma-

chine, operating at night, could cut these places. A series of five rooms on each entry would be producing constantly till the entries were finished. In addition there could be drawn at least two room pillars on each entry at the same time. Following the extraction of three room pillars on each entry, the entry stumps could be started.

Altogether such a pair of headings would give work to 32 men distributed as follows: Rooms, 20 men; pillars, 8 men; entry stumps, 4 men. The production of coal would be practically as follows: Ten rooms, at 20 tons each, 200 tons; 4 pillars, at 15 tons each, 60 tons; and entry stumps, 30 tons, making a total of 290 tons.

Two pairs of butt entries and three main entries in operation at the same time, with one man in each, would advance say 5 linear ft. of entry each shift, and the entries being 10 ft. wide, would each produce 8 tons of coal per shift, or 56 tons for the seven entries, making a total of 346 tons from rooms and entries. With cars of 2 tons' capacity this output will require 173 cars. A haulage motor making 5 trips per day would haul an average trip of 35 cars and such a productive area could be included within a linear distance of one-half mile and could be served by one gathering motor that would have to travel a distance on the main and lateral entries of, say, 3 mi. in making a trip, or a distance of 15 mi. per day or 1.5 mi. per hr., in a 10-hr. day.

Four such sections would thus produce an output of 1,384 tons per day. With the entries on double shift, for the four sections, an additional 224 tons could be produced, making a total of 1,608 tons. Such a production would require 4 motors for the day and 2 for the night shift; and 6 trackmen, 2 wiremen, 2 bratticemen and 2 rockmen or timbermen, in addition to the motor repairmen, would be a sufficient force for the inside work.

This is a very conservative estimate of the production, which in actual practice could undoubtedly be increased 20 per cent.

#### COÖRDINATING THE WORKING FORCES IMPORTANT

The principal feature, which I wish to emphasize, is the coördination of the various working forces and the concentration of the productive factors that are attainable by such a system.

The method of extraction I have assumed is the retreating plan, in the room-and-pillar system. It is this system, or at least a partial application of it, that has made the H. C. Frick Co. famous, not only throughout the United States, but the world at large. The retreating method of extraction, whether in room-and-pillar or longwall work, affords economic advantages over an advancing method of mining in practically every particular, but the principal objection to its general adoption is the fact that the returns on the investment are not so rapid. Granting this to be true, it may be stated that while quick returns are desirable, greater returns at a later date will produce larger dividends, which will more than offset the interest arising from earlier returns.

For illustration, assume an area of 1,000 acres of coal to be extracted on the room-and-pillar system. Whether this area be developed on the advancing or the retreating system, it will take the same amount of narrowwork in each case, and therefore the cost of development will be the same. The common method of procedure is to develop the lateral entries as soon as the main entries have reached a certain specified distance, and the same

method can be adopted in the retreating plan. As soon as the lateral entries are developed sufficiently to start a room, the room is turned off. Even though the pillars between the rooms are extracted as soon as the rooms are finished, when the entry has reached the boundary there will be nothing left to extract but the entry stumps, and these must necessarily be taken out by pickwork, while in the retreating method the larger part of these can be recovered by machine. The extraction of entry stumps of the length common in the Somerset field will engage eight men, a mule and driver a year.

In the instance given, or under any other conditions in which the room-and-pillar system is adopted, the retreating method can be employed as soon as each pair of lateral entries reaches its limit, so that the only delay in obtaining returns on the investment is the time spent in driving a single pair of entries to the limit.

In addition to the facilities afforded for concentration and efficiency, the retreating method presents other economic features: 1. It eliminates to a large extent the possibility of a squeeze where the conditions are favorable for such to occur. 2. A better grade of coal is produced. 3. The coal is not subjected, to the same extent, to the deteriorating influence of atmospheric conditions and will contain a larger percentage of the volatile gases and bituminous matter, which should make it a more valuable fuel. 4. Less timber is required and a larger percentage of that can be recovered. 5. Fewer rails and ties are required. 6. A greater percentage of the coal is extracted. 7. The aircourses are maintained in better condition at less expense.

A. M. INER.

Jerome, Penn.

■

#### Efficient Mine Foremen

*Letter No. 33*—Much has been said in regard to the efficient mine foreman, and the field of his operation has been well gone over, yet it seems to me that there is a section in his orbit on which the light of day has never shone. I shall endeavor, by narrating the following brief incident, to illumine this part of the mine foreman's career, for it is an experience shared by many and for which they are not in any way responsible.

I recall an efficient, well-organized coal-mining proposition where the operations were in charge of a foreman whose ability could not be challenged. All was going well when a change took place in the superintendency; and as the old saying is, "New kings make new laws," and their disposition is generally to surround themselves with those who they suppose are true and loyal servants.

A new superintendent is often jealous of the old hands, or he has a number of his friends in mind for different places in the organization. Before he can appoint his friends to the places they desire, however, he must adopt some procedure that will create vacancies. He does not act immediately, but starts to work on the mine foreman first, by restricting the supplies going into the mine, changing his instructions in regard to the work underground and in other ways worrying and embarrassing the foreman's efforts to maintain the same standard as formerly. He may direct one or more of the subordinates to do differently from what the foreman has told them. He employs new help and sends them into the mine without previously consulting the foreman as to whether

their services are needed. By these and other methods he destroys the efficiency of the foreman, making it appear that he is not as capable a man as had been supposed. This results in the mine foreman being blamed for many things for which he is not directly responsible.

Permit me to say, in closing, that there is but one way for a superintendent to prove the efficiency of his foremen. He must take them into his confidence, talk over conditions in the mine and second their efforts, and never override their authority with the men. Should the foreman then prove a failure, he must yield his place to another more capable man.

MINE FOREMAN.

—, Ind.



### Carbon-Monoxide Poisoning

*Letter No. 1*—As being one who has been "knocked out," as the boys say, or in other words been overcome by this gas, permit me to indorse the comments of Doctor Knoefel in regard to its effect on the human system and the treatment he has prescribed in *Coal Age*, Mar. 4, p. 429.

As to treating a man who is in the habit of taking liquor I want to say that, while a drink of brandy after the man has recovered his consciousness will enable him to go to work sooner, it may be a bad plan, inasmuch as it may tempt such men to expose themselves to the effect of gas for the purpose of getting the drink.

I know that men given to the drink habit, as has been stated, are more susceptible to the effects of the gas than those who let drink alone. I have found, also, that when the weather will permit and it is not cold it is often better to let the person be in the open air than to take him into any house or shanty where the air is not as fresh. My remarks refer only to the treatment of men after they have been restored to consciousness.

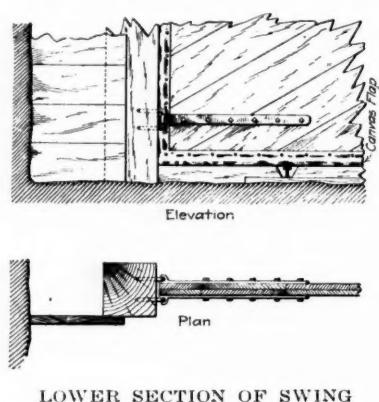
A. MINER.

Carbondale, Penn.



### Double-Acting, Self-Closing Mine Trapdoor

*Letter No. 6*—I am sending a rough sketch of a good mine door that has been in operation for almost two years in the mine of which I am foreman. This door has not cost the company \$2 for repairs in that time, and has given such good satisfaction that I am glad to pass the idea along, believing that it meets all the requirements of a self-closing door that can be opened by a mule passing in either direction, but that will resist the pressure of the air current. The door is set in a substantial frame made of square timber. The upper hinge is the ordinary heavy strap hinge fitted to a strong bolt set in the center of the face of the post. The lower hinge is formed by two straps of iron securely bolted one on each side of the door. Each of these straps is forked at the end, as shown in the plan in the figure.



The forked end of each strap fits over a staple driven in the face of the post. These two staples are about 5 in. apart.

It is readily seen that by means of this arrangement the open door will have a considerable fall, which will enable it to close readily when released. The two pronged hinges at the bottom of the door form a base of 5 in. that gives sufficient stability to the door to enable it to resist the pressure of the air current acting to force it open.

T. H. WILDING.

Lochgelly Mine, W. Va.

[The above plan is also suggested by C. M. Cagel, Herrin, Ill., and R. R. Schellenger, Benham, Ky., as being the design of M. I. Bowen of the same place. Also, William James, Mystic, Ia., describes what is practically the same plan or arrangement as that already described by W. H. Clark, in his letter No. 3, on page 508 of the last issue of *Coal Age*, the weight and pulleys being shown in Letter No. 2 of the same issue.—Editor.]



### Drilling and Shooting Coal

*Letter No. 1*—In response to the request for a general discussion of this important subject that appeared in *Coal Age*, Mar. 4, p. 422, I gladly offer the following suggestions as representing the best and safest practice in blasting coal:

To begin, it is much safer for the coal to be mined or sheared before it is blasted. Unfortunately, however, restrictions offered by the miners' union, labor conditions in the district, competition of neighboring mines and other similar factors render the shearing and mining of the coal impracticable. As a result, in certain mining districts the coal is quite generally shot off the solid, and mining or shearing is unknown.

When driving entries or other narrowwork in those districts "cutting" or "cracker" shots are used. Such shots should not be drilled more than a foot ahead of a previous shot, and should in all cases be charged with permissible powder, if this is practicable. Every care should be taken, especially in narrowwork, to avoid placing a shot too deep on the solid or where the work will be performed with difficulty and may result in a blownout shot.

Where mining or shearing is done, no hole should be drilled beyond the back of the mining or so that the charge will lie on the solid. In all cases the diameter of the auger or drill should not exceed 2 in. Augers or reamers of a greater diameter should not be allowed to be taken into the mine. The length of the auger should not exceed 6 ft. Every miner should have and use a scraper for cleaning his holes, and no hole should be charged before it has been thoroughly cleaned of the fine dust produced in drilling. Also, every miner should have a copper-tipped or, better still, a wooden tamping rod. Every hole should be tamped its full length with clay or dirt taken from the road. No coal or other inflammable material must be used for tamping. Care must be taken in charging a hole to push the cartridge clean to the back of the hole. No hole must be fired in proximity to any accumulations of fine dust, nor must any shot be fired depending on the previous explosion of another shot.

There is a considerable difference of opinion in regard to the relative safety of fuse and squibs in blasting. I

believe that each of these possesses its peculiar advantages and disadvantages, but will not attempt to discuss them here. The safest practice is firing by electricity from a point on the surface after the men have all left the mine. Where this is not done, a hand battery can be used, which is safer than firing with fuse or squibs.

#### EMPLOYMENT OF SHOTFIRERS THE SAFEST PLAN

The employment of shotfirers is always the safest plan, whatever the natural conditions in the mine. This is not essential, however, where the mine is naturally moist and free from gas and dust. The employment of shotfirers avoids the possibility of a serious explosion occurring as the result of someone doing what he ought not to do or leaving undone what he should do, which is possible under any conditions. Where shotfirers are employed they should charge as well as fire each hole. Unless the shotfirer himself loads the hole he cannot know its depth or direction or the charge of powder it contains and cannot therefore judge of the safety of the shot.

A good shotfirer is only an experienced miner, but it is easier to find a few dependable shotfirers of good judgment than to rely on securing the same element in a large number of miners. As shown by the incident narrated, *Coal Age*, Feb. 19, p. 348, many miners will load a hole for some one else to shoot that they would not fire themselves. The selection of shotfirers should be performed with the greatest care, and they should be authorized to refuse to charge or fire any hole that would be unsafe in their judgment.

In most cases where the shots are fired from the surface by electricity, the holes are first examined by a competent inspector before being charged by the miner. The inspector then gives the miner a sufficient number of detonators to fire those holes that he has approved. As the men are all out of the mine when the shots are fired, this system avoids the risk to human life, but the safety of the property will depend on the judgment of the inspectors who examine the shots before the holes are charged.

#### GOOD JUDGMENT OF SHOTFIRERS ESSENTIAL

The importance of a shotfirer using good judgment in the performance of his work is illustrated by an incident that occurred several years ago in a steeply pitching seam of coal that generated both gas and dust. In this case fuse was used to fire the shots. According to his custom, the shotfirer went first to the foot of the slope so as to fire the shots there before water had time to accumulate. The miner had failed in this instance to leave any rags for swabbing out the hole, and the shotfirer, with more heart than brains, not willing to leave the miner without coal for the next day, cleaned as much water from the hole with his scraper as he could, shoved the dynamite cartridge to the back of the hole, and with little tamping other than a loose dummy, cut the fuse short, lit it and ran up the slope. Before he could reach a place of safety, he was rolled over and burned slightly by the blast, which did little execution in the coal, but blew several cars off the track, broke down a door and knocked down a few timbers.

The fact that the slope had been sprinkled the day before probably averted a serious mine explosion and saved the shotfirer's life. Only a short time previous, a demonstration made for the purpose showed that permissible explosives would do good work in this coal and, though offered at a price that would cost the miner no more than

the dynamite required for the same work, they were refused because the union officials claimed that their contract provided for a standard grade of black powder and dynamite to be used under prescribed conditions.

#### UNRELIABLE SHOTFIRERS

Another incident serves to illustrate the unreliability of some shotfirers. I was visiting a mine in a steeply pitching seam that was very dry and dusty. The miners were not permitted to fire shots in the presence of dust or before the place was sprinkled, and to give the necessary warning before firing. We were passing up a room when a shot was fired at its face, and we owed our lives to the fact that the shot had been well placed and did its work in the coal. Otherwise, we would not have escaped, as the place was very dusty and had not been sprinkled and no warning was given before the shot was fired. We found the shotfirer and the miner in a crosscut above us, but the former had no excuse to offer for his failure to obey the instructions given him in regard to firing.

On a visit at another mine, I found a shotfirer in the act of tamping a shot with coal dust and using an iron tamping bar, although he had with him a wooden tamper and a bucket of clay, and was violating his instructions in not using them. Surely eternal vigilance is the price of safety!

Permit me to say in closing that it is important to make rules looking toward safety, but what is of still greater importance is the enforcement of the rules after they are made. I believe that more disasters are due to the lack of enforcement than to the lack of rules.

EDWARD H. COXE,  
Knoxville, Tenn. Consulting Mining Engineer.

*Letter No. 2*—There is one common practice in connection with the drilling and shooting of coal against which I wish to enter a most vigorous protest. The practice to which I refer is that of crimping dynamite caps with the teeth.

In shooting "monobel" powder or dynamite with detonating caps and fuse it is necessary to crimp the end of the cap after the fuse has been inserted, so as to hold the fuse and cap in proper and safe relation to each other during the operation of charging and tamping the hole. The crimping should of course be done with a crimper, or a pair of specially shaped pincers. As a usual thing in mining practice I have found that no such tools are available when needed.

Caps can be safely crimped with an ordinary jackknife. The most serious accident that can then happen would be the injury or loss of a hand, should the cap be accidentally discharged in crimping.

A great many men, however, do not seem to realize how much danger lies hidden in the small bulk of a detonating cap. They persist in crimping these caps by biting the end with the teeth. This is a very common but dangerous practice for which there is absolutely no excuse. The accidental discharge of the cap while in the mouth would mean instant death. Too often we hear of a man having the top of his head blown off in this way. Is it not too great a risk to take when a pocketknife can almost always be had in a moment or two?

C. W. STAFFORD, Trackman,  
McVeigh, Ky. Pond Creek Coal Co.

## Inquiries of General Interest

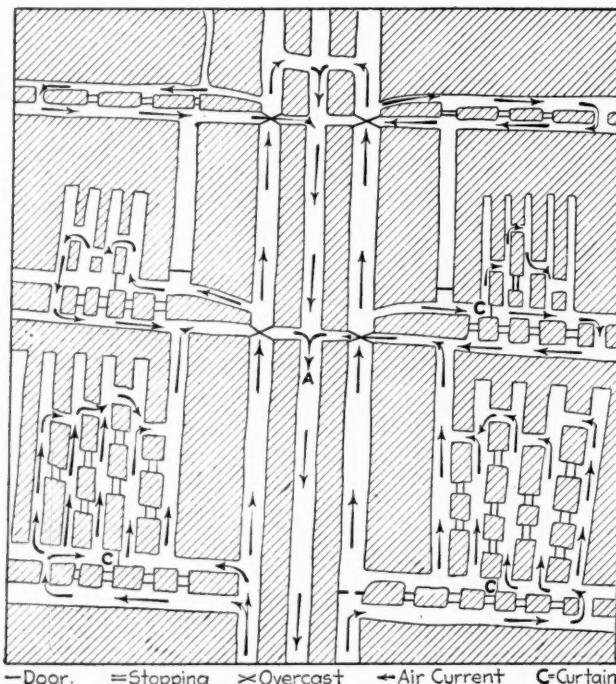
### Locating a "Booster" Fan

I am inclosing in my letter a rough freehand drawing of a three-entry system used in our mine. The mine is ventilated by a Stine disk fan 6 ft. in diameter, which gives 30,000 cu.ft. per min. in the mine. We have another fan of the same size and type, which we would like to set up at some point in the mine as a "booster" fan. This is necessary, because the quantity of air circulated by the fan at the mouth of the mine is insufficient for the requirements.

Inasmuch as we cannot agree as to where the second fan should be placed to give the best results, I am appealing to *Coal Age* to decide this question for us. I hope by this means to get some good suggestions from readers who have had experience with "booster" fans installed in the mine for the purpose of increasing the quantity of air in circulation. P. J. DOOLAN, Mine Superintendent,

Stone, Ky. Tierney Mining Co.

The accompanying figure is a more or less exact duplication of the rough sketch sent us by this correspondent.



A POORLY DESIGNED VENTILATING SYSTEM

A reference to the figure would seem to indicate that the 6-ft. Stine disk fan, said to be producing a circulation of 30,000 cu.ft. of air per minute in the mine, is located at the mouth of the center or main-return airway. If this assumption is correct, the fan is exhausting air from the mine. The two side entries may then be assumed to be the main intake and haulage roads for each side of the mine respectively.

Many suggestions could be made, no doubt, showing how the circulation indicated in this figure could have

been arranged to produce better results. It frequently happens, however, that the circulation of air in a mine is the result of an unfortunate development that may have been a practical necessity in order to avoid an expense that the output would not warrant. Such may be the case in the present instance, where the circulation, shown by the arrows, is open to severe criticism.

But accepting the circulation, as shown in the figure, the question asked is, Where can the 6-ft. disk fan be located to most effectively boost the circulation? In order to answer this question intelligently, one should know in what section of the mine the ventilation is most deficient.

Judging from the figure, it would seem that the greatest trouble would be experienced in the workings off the first two pairs of entries turned to the right and left of the main headings. The circulation in each of these sections is more congested than that in the rooms turned off the second pairs of entries on the right and left of the main headings. Each of these circulations, however, is choked by having to pass through a single entry and over a single overcast before reaching the main-return entry at the point marked A on the plan. As a result, we may assume that the combined circulation of these four sections, located to the right and left of the main headings, needs the boosting and that the circulation in each of the third pairs of cross-entries turned to the right and left of the main headings will then take care of itself.

One of the main considerations in the location of a "booster" fan is to provide for proper balancing of the circulations in the different sections of the mine.Replying to this question, then, since there is but a single booster to be installed, we would locate that at the point marked A on the plan, just outby from the mouth of the second pair of cross-entries, on the center or main-return airway. We hope to hear from others on this question.

### Effect of Fall of Barometer on Emission of Gas

Kindly explain what effect a fall of barometer has on the gases occluded in the coal and other strata. Do they issue from the formations more readily or in greater volume when the barometer is falling than when it is rising?

Linton, Ind.

FIREBOSS.

In reply to this inquiry it may be stated that a fall of barometer does not materially affect the outflow of gas from the pores of coal or the emission of gas occluded in the coal formations, the change of atmospheric pressure being too slight in comparison with the forces concerned in the emission of gas. The gases occluded in these formations often exert a pressure many times that produced by the weight of the atmosphere, and the rate of transpiration of the gas is not materially increased even in a vacuum where the pressure is reduced to zero.

## Examination Questions

### West Virginia Mine Foremen's Examination, 1916

#### (Selected Questions)

*Ques.*—What particular dangers are there in pillar drawing, and what in your opinion should be done to prevent accidents?

*Ans.*—When drawing pillars, the miner is working on a loose end and is particularly subject to the danger of falling roof. The danger is greater as the pillars have stood a longer time and have become more or less crushed or weakened under the weight of the subsiding roof strata. He is also subject to the danger arising from gas accumulated on the fall.

To avoid accident from the first cause, the miner must set the necessary posts for his protection and keep a way open for his escape in case of need. He must examine the roof carefully over the pillar to discover any possible slips or faults and must not permit himself to work under a top that is loose or dangerous. The work of drawing timber as the pillar is taken out is particularly dangerous and should only be done by an experienced miner using a machine for that purpose. In order to avoid danger from gas accumulating on the falls, a good ventilating current should be made to sweep the place, and if necessary, canvas should be used to deflect the air onto the falls. It is frequently necessary to erect a special brattice for this purpose, as a slight fall of roof while the men were at work would drive the gas down on their lamps.

*Ques.*—What should be considered in determining the size of pillars in mines?

*Ans.*—The size of pillars is determined in relation to the size of opening, with due regard to the depth of cover, nature of the roof, floor and coal, and the thickness and inclination of the seam, as well as the time the pillars are required to remain before being withdrawn.

*Ques.*—What conditions would guide you in determining the width of headings in rooms?

*Ans.*—The width of headings is determined by their use, with due regard to the nature of the roof, floor and coal, depth of cover, and thickness and inclination of the seam. A heading is often driven 14 ft. in width in order to avoid the payment of yardage or to furnish space for the stowing of the waste taken from the roof or floor of the entry. The width of haulage roads should always be sufficient to provide a good clearance at the side of the road for men to pass the cars. This is made a requirement in many mining laws.

The width of rooms is determined largely by the depth of cover, nature of the roof, floor and coal, and the method of mining employed at the face.

*Ques.*—In your opinion would a good system of timbering prevent accidents?

*Ans.*—No system of timbering, however good, will prevent accident unless due care is exercised by the miner. With proper care, however, the adoption of a systematic method of timbering that is adapted to the particular conditions in the seam will go far toward preventing

accidents from falls of roof and coal. Delay in setting necessary timber at the working face is responsible for more accidents than the system employed.

*Ques.*—In a room with a fair roof, how far apart would you place timbers?

*Ans.*—No rule can be given for the distance apart of room timbers that will be applicable in all cases and under all conditions. Rooms are frequently driven, under a good sound roof and with sufficient room pillars, the entire distance without setting any timbers at the face. A better practice, however, is to set a few timbers at the face, as a means of observing any movement that may take place in the roof and as an extra protection for the miner while he is at work. Under a fair roof, room timbers may be set 5 or 6 ft. apart.

*Ques.*—Where the roof is bad, how should room timbers be placed?

*Ans.*—When driving a room under a bad roof, posts should be stood in two or more lines parallel to the face. The posts should be from 2 to 3 ft. apart and staggered; that is to say, the posts in alternate rows should not be stood behind each other, but spaced halfway between the posts in the next row. The first row of posts next to the face should be close enough thereto to avoid the danger of loose pieces of slate falling on the miner while at work.

*Ques.*—In driving entries or rooms that are known to liberate explosive gases, what precautions would be necessary to insure safety to the workmen?

*Ans.*—Only safety lamps of an improved type should be used when driving rooms or entries under these conditions. Each opening driven should be in the charge of an experienced miner familiar with gas. No one should be permitted to enter the mine before the firebosses have completed their examination in the morning and reported the mine as being safe for work. All safety lamps should be given out at the lamp station, after having been thoroughly cleaned, filled, lighted and inspected by a competent lampman in charge of the station. These safety lamps should be securely locked in a manner that will show any attempt on the part of the miner to tamper with the fastenings. No matches should be allowed to be carried into the mine.

Where blasting is performed, all holes should be inspected, charged and fired by competent and duly authorized shotfirers after the men have left the mine. Where electricity is used for power or lighting, the installation should be in the charge of competent electricians and every precaution should be taken to avoid the sparking of the wires that might cause the ignition of gas. No accumulations of dust should be permitted on the roadways or at the working face. The firebosses should make an examination of each working place in his charge while the men are at work and observe carefully the condition of the place and the safety lamps used by the men and give any necessary instructions to avoid possible accidents. Special care should be exercised when driving an opening that is approaching a fault or abandoned workings of the same or other mines.

## Recent I. C. C. Decisions

**No. 52 (Ex Parte)—In the matter of filing with the Interstate Commerce Commission divisions of joint rates applicable to railway fuel coal.**

1. Carriers using fuel other than coal required to file their divisions of joint rates on such fuel in the transportation of which they participate and are required, when changes are made in such divisions, to file a statement of facts relied upon as justification for such changes. A supplemental general order will issue under the provisions of section 6.

2. Inquiries concerning certain features of the order in this proceeding, with respect to which carriers are in doubt, answered.

**I. C. C. No. 463—Investigation and Suspension Docket. Coal to Rhode Island points.**

Proposed increased all-rail rate on bituminous coal in carloads from the Clearfield district in Pennsylvania to Providence, Auburn, and Olneyville, R. I., found justified.

**I. C. C. No. 5917—G. B. Markle Co. et al. vs. Lehigh Valley Railroad Co.**

Upon complaint that rates applying upon anthracite coal in carloads from certain collieries in the Lehigh coal region of Pennsylvania to Perth Amboy f.o.b. vessels for trans-shipment are unreasonable and unjustly discriminatory. Held:

1. Reasonable rates for the future will be secured complainants by the order entered in "Rates for Transportation of Anthracite Coal," 35 I. C. C., 220.

2. Following Plymouth Coal Co. vs. L. V. R.R. Co., 36 I. C. C., 140, defendant found to have justified its refusal to continue to furnish storage bins at Perth Amboy, N. J., for the free storage of anthracite coal, and defendant's demurrage regulations governing anthracite coal awaiting trans-shipment at Perth Amboy found reasonable.

3. Question of reparation held in abeyance for determination in a supplemental report.

**I. C. C. No. 5922—Mitchell Coal & Coke Co. vs. Pennsylvania Railroad Co.**

1. The service over private tracks from the mines and coke ovens of shippers to the rails of the carrier is neither compelled nor prohibited by statute or at common law; but whichever course the carrier pursues the statutory inhibition of unjust discrimination and unreasonable preference or advantage must be observed.

2. When the carrier employs a shipper to perform this service for it, if the compensation is excessive, the shipper obtains an unreasonable preference and advantage in violation of the regulating statute.

3. The allowance paid by the defendant here to the competitors of the complainant was unreasonable and unlawful to the extent that it exceeded 8 cents per ton.

**I. C. C. No. 6189—Red Ash Coal Co. vs. Central R.R. Co. of New Jersey.**

Upon complaint that rates applying upon anthracite coal in carloads from Ashley, Penn., to Elizabethport and Port Johnston, N. J., f.o.b. vessels for reshipment are unreasonable; Held:

1. Reasonable rates for the future will be secured complainant by the order entered in Rates for Transportation of Anthracite Coal, 35 I. C. C., 220.

2. Following Plymouth Coal Co. vs. D. L. & W. R.R. Co., 36 I. C. C., 76, defendant's demurrage regulations governing anthracite coal awaiting transshipment at or near Elizabethport and Port Johnston found reasonable.

3. Question of reparation held in abeyance for determination in a supplemental report.

**I. C. C. No. 6678—Charles W. Davis vs. Minneapolis, St. Paul & Sault Ste. Marie Railway Co.**

Rates charged for the transportation from Manistique, Mich., to Gladstone, Mich., of shipments of hard and soft coal, in carloads, originating in Pennsylvania and West Virginia, found to have been unreasonable to the extent that they exceeded rates of 75 and 50c. per net ton, respectively. Rates of 75c. on hard coal and 50c. on soft coal prescribed as maxima for the future. Reparation awarded.

**I. C. C.—Bituminous coal rates to the Southeast.**

1. Upon the facts adduced of record rates on bituminous coal from the Tennessee, Virginia and West Virginia coal fields to southeastern destinations found to be unduly discriminatory and unreasonable in the particulars pointed out in the report, and a basis for reasonable and nondiscriminatory rates in the future suggested.

2. The present rates on bituminous coal from the Appalachian and Danita districts, in Virginia, to Spartanburg, S. C.,

and from the Pocahontas and New River districts, in West Virginia, to Lynchburg, Va., found unreasonable and reasonable rates prescribed for the future.

3. Joint rates and through routes prescribed on coal from the Pocahontas district to Spartanburg and other points on the Carolina, Clinchfield & Ohio Railway, via St. Paul, Va.

**I. C. C. No. 7409—Reeves Coal Company vs. Chicago, Milwaukee and St. Paul Railway Co.**

Defendant's failure properly to advise complainant as to the route traversed by a carload of coal from Roosevelt, Tenn., to Dell Rapids, S. Dak., and defendant's subsequent failure strictly to observe the terms of complainant's reconsigning order; Held, Not to be a violation of the act to regulate commerce. Complaint dismissed.

**I. C. C. Nos. 7527 and 7527 Sub. 1—Detroit Coal Exchange vs. Michigan Central R.R. Co. and same vs. Grand Trunk Western Ry. Co.**

Upon complaint that the rules and charges governing the weighing and reweighing of carload freight in Detroit, Mich., are unreasonable and unduly preferential. Held:

1. That the Commission has jurisdiction of the weighing service, when the freight is moved in interstate commerce.

2. That it is the duty of the delivering carrier, upon reasonable request, to reweigh carload freight which has been transported in interstate commerce.

3. That the present charges for this service in Detroit, Mich., are unjust and unreasonable. Just and reasonable charges prescribed for the future.

4. That the inability of carriers participating in the interstate transportation of a car to agree upon their respective assumptions of costs for reweighing when such reweighing develops a shortage in excess of the limit of tolerance, can not be used to increase charges against the shipper.

**I. C. C. No. 7796—South Canon Coal Co. et al. vs. Colorado Midland Railway Co. et al.**

Rates on bituminous coal in carloads from South Canon, Colo., to destinations in Wyoming, South Dakota, Nebraska and Kansas, found to be unjustly discriminatory in so far as they exceed the rates from Walsenburg, Colo., to the same destinations by more than 25c. per net ton. The rates from Cameo, Colo., not shown to be unjustly discriminatory.

**I. C. C. No. 7830—Northern Colorado Coal Co. vs. Chicago, Wyoming & Eastern Ry. Co.**

The complainant alleges that the defendants' rates on soft coal from Coalmont, Colo., to points on their lines in Colorado, Wyoming, Nebraska, and Kansas are unreasonable and unjustly discriminatory as compared with the rates to the same destinations from Hanna, Wyo. It further alleges that no joint rates are published from Coalmont to stations on the lines of some of the defendants while such joint rates are published from Hanna to these stations, and that the complainant is thereby subjected to unjust discrimination; Held, (1) That the rates from Coalmont are not shown to be unreasonable per se; (2) that the rates from Coalmont are shown to be unjustly discriminatory to the extent that they exceed by more than 25c. per net ton the rates contemporaneously maintained from Hanna; (3) that defendants should establish through routes and joint rates from Coalmont to stations on the Chicago & North Western Railway, the Colorado, Kansas & Oklahoma Railroad, the Missouri Pacific Railway, and the Chicago, St. Paul, Minneapolis & Omaha Railway.

**Investigation and Suspension Docket No. 655.—Rate increases in Western classification territory—Part III.**

1. Proposed increase from 30,000 lb. to 40,000 lb. in the minimum carload weight on grain products and from 40,000 to 50,000 lb. in the minimum carload weights on wheat and rye found justified.

2. Following 1915 Western Rate Advance Case, 35 I. C. C., 497, 603-611, proposed increased rates on bituminous coal from Illinois mines and other points to points west of the Mississippi River found justified.

3. Cancellation of the present interstate commodity rate on gas coke in carloads from St. Charles, Mo., to St. Louis, Mo., found justified.

4. Proposed increased rates on broom corn from points in Kansas and Oklahoma to points in Colorado and New Mexico not justified.

5. Proposed increased rates on wheat and corn between Arkansas stations on the St. Louis & San Francisco R.R. and Memphis, Tenn., justified.

## Coal and Coke News

### Harrisburg, Penn.

The Federal Jury, on Mar. 16, brought in a verdict of guilty against the Lehigh Coal and Navigation Co., for soliciting, accepting and receiving rebates from the Central R.R. of New Jersey.

The indictment was in 27 counts. The maximum fine possible under the verdict is \$540,000, but the jury in returning its finding, recommended mercy.

This case marks the second stage of a prosecution which was begun over a year ago, as a result of the practice of the Central R.R. of New Jersey in paying the Lehigh Coal and Navigation Co. allowances out of the lawfully published rates on all shipments of anthracite coal made by the coal company from Nesquehoning, Penn., to points in New Jersey.

The defense offered by the Lehigh Coal and Navigation Co. in the course of the trial was that it acted in entire good faith in accepting payments, since they were made as a part of the consideration under a contract by which the navigation company in 1871 leased the Lehigh and Susquehanna R.R., extending from Mauch Chunk to Easton, to the Central R.R. for 999 years. This same defense of good faith had been urged by the Central.

In the course of the argument the attorney for the government called attention to the fact that in addition to the fine which may be imposed against the Lehigh Coal and Navigation Co. for the offenses of which it was convicted, the Elkins Act provides that the government may bring a further suit for the recovery of three times all of the rebates which the Navigation company has received during the past six years. It is said that this penalty might amount to several millions of dollars. It is anticipated that the fine will not exceed \$200,000, the penalty imposed upon the Central R.R. of N. J., for granting the same rebates as were involved in the coal company's case.

Following the precedent in the railroad rebating case, it is assumed that the court, probably after consultation with the Interstate Commerce Commission, will determine what it considers an adequate penalty for the offense and will suspend sentence upon the remaining counts. The Court has fixed Mar. 31 for fixing the sentence.

At the next term the Erie R.R. will be placed on trial on an indictment charging it with granting of concessions in a shipment of 100 tons of coal from New York to St. Joseph, Mo. In this case the Government alleges that the railroad charged the import rate when the domestic rate should have been charged. There is only one count in the indictment, so that if the railroad should be found guilty it would be subject to a fine of from \$1,000 to \$20,000.

#### Why Did the Price Rise?

The commission to investigate the cause of the rise in the price of anthracite coal, appointed by the Governor and provided by the last legislature, when it was contended that coal operators added approximately 25c. to each ton of coal mined to cover the 2½ per cent. state tax on hard coal, will, it is expected, begin hearings shortly in Wilkes-Barre, Scranton, Pottsville and other points in the coal region.

Under the act creating the commission a report was to have been filed Jan. 1, this year, but as Governor Brumbaugh did not select the three commissioners until shortly before the time, this was impossible. It is expected that a report will be filed during the summer, and that a more complete report will be ready for the next legislature.

The sum of \$5,000 was provided for the commission, which has the power to employ a secretary and a stenographer, to hold hearings in any place in the Commonwealth, subpoena papers, compel attendance at meetings and to call upon the attorney-general for legal advice.

#### PENNSYLVANIA Anthracite

**Hazleton**—Heads of mining corporations say that they expect a big boom after Apr. 1. The Lehigh Valley Coal Co. plans a new breaker at Buck Mountain, and has already started to remodel its old Drifton structure. The Pond Creek Coal Co. will resume its operations in Foster Township. The tunnel to remove the Hazleton Basin mine water into Butler Valley will be started it is believed, by the Lehigh Valley

Coal Co. An area of virgin coal on the Porter tract in the Coxe lands is to be tapped. Stripping work at Upper Lehigh, Oneida and Buck Mountain also is to be commenced. The Lehigh Valley Coal Co. will probably reopen its No. 2 colliery at Drifton, that has been closed about a year. By the sinking of an additional slope the coal can be taken out to an adjoining breaker for preparation.

**Harrisburg**—Charles P. Neill, umpire of the anthracite conciliation board, in a decision handed down on Mar. 17, rules that the Locust Mountain Coal Co., of Schuylkill County, has the right to install time clocks at its mines and that this action does not constitute a change in conditions not warranted by the agreement of 1912. The umpire declares that nothing was adduced by the men in their grievance to show that their interests were adversely affected. A short-lived strike occurred at the time the clocks were put in. Three other decisions are against the miners and one in their favor. All of them involve employees of the Lawrence and Stanton collieries of the Harleigh Brookwood Coal Co. in the Schuylkill district, who charged reduction in prices for certain kinds of work. In the one that is sustained the operators are ordered to restore the old scale.

**Yatesville**—For the second time within a week the mountain cut-off branch of the Lehigh Valley R.R. was put out of service on Mar. 16, as a result of a mine cave-in. The surface settled several feet for a distance of over 150 ft. The mine workings belong to the Pennsylvania Coal Co. The cave-in was discovered by track walkers, and all trains were run over the main line through Wilkes-Barre.

**Pottsville**—Anthracite operators are experiencing a shortage of labor and operations of the collieries are hampered. Alluring offers of high wages paid by manufacturers have depleted the ranks of mine workers. The result is that many miners are forced to perform their own work and that of a laborer in addition. At a number of collieries there is need of 300 men in order to bring the working forces up to normal. All collieries are not affected, but operators admit that the situation is getting to be serious.

**Seranton**—The coal region is to be treated to another holiday on Apr. 1, at which time the miners' union has ordered all men to suspend work in order to celebrate the agreement which has been made by the bituminous miners securing an 8-hr. working day, and which is one of the demands presented by the anthracite miners in their present contest with the operators.

**Wilkes-Barre**—At the suggestion of the United Mine Workers of America, the district attorney of Luzerne County has filed an exception to the ruling of Judge Strauss in quashing the indictment in the criminal charge brought by Emily Johnson against Richard Jones, a former assistant mine foreman for the Lehigh Valley Coal Co., who was charged with receiving money from mine employees. Jones was indicted for a violation of the criminal law in receiving money from employees, but the indictment was attacked on the ground that Mr. Jones as a mine foreman was not an employer, but an employee of the coal company. Judge Strauss sustained the theory of the law and quashed the indictment. Judge Strauss willingly allowed the exception and sealed the bill, so that his ruling can be appealed and the question decided by the higher court.

Work was recently resumed at the Nottingham Colliery of the Lehigh & Wilkes-Barre Coal Co. after an idleness of one day. Miners at this plant have a list of grievances and a strike was called but the miners agreed to return to work. A committee was appointed to confer with the mine officials in an endeavor to settle the grievances.

**Lansford**—The saloonkeepers of this place, Nesquehoning, Summit Hill and Coaldale, upon receiving a request from Edwin Ludlow, vice-president of the Lehigh Coal and Navigation Co. not to open their barrooms until after 7 a.m. agreed to comply.

#### Bituminous

**Washington**—The Canonsburg District is almost certain to have another coal mine in the near future. It is believed that this spring the Pittsburgh capitalists who last year purchased the coal under the J. B. McBride farm, North

Strabane Township, on the Chartiers Ry., will begin the work of opening a mine. It is said that the right-of-way for a spur from the Chartiers road has been secured and that this will be built from Shingiss Station. The mine, if opened, will be strictly modern and have a large output.

**Connellsville**—A good car supply enabled the Connellsville region to produce a greater amount of coke recently than for some weeks previous. Shipments amounted to 463,000 tons, while production was 457,000 tons. This amount would have been increased somewhat had there been sufficient labor.

**Charleroi**—Ovens of the Belleveron Coal and Coke Co. are being warmed up preparatory to firing. The ovens will be put in operation for the first time in three years. These ovens were built about five years ago and were fired immediately after construction. After a brief period they were forced to discontinue on account of poor industrial conditions and have not been in operation since.

**Patton**—Examinations for certificates of mine foremen and firebosses will be held in the United Mine Workers of America Hall, Apr. 11, 12, 13 and 14. Applicants for the position of foreman and assistants are required to be citizens of good character at least 23 yr. old and of at least five years' experience inside Pennsylvania mines. For firebosses the requirements are the same with additional experience in mines that generate explosive gas. All candidates must be able to read and write English.

**Wimber**—The extensive and prosperous operations of the Arrow Coal Mining Co., controlled by William Gahagen, were recently optioned by an Eastern syndicate, the price named in the option being between \$400,000 and \$500,000.

**Pittsburg**—Judge Orr, of the Federal District Court, on Mar. 15, discussed a preliminary injunction on the petition of the People's National Bank, of Laurel, Del., restraining the Commonwealth Trust Co., of Pittsburgh, from selling the property of the United Coal Co.

To satisfy a mortgage of \$2,714,000 held by the Farmers' Loan and Trust Co., of New York, the U. S. District Court has ordered the sale of three coal properties of the Merchants' Coal Co. This company is one of the interests held by the Kuhn banking house and went into the hands of the receivers at the time of that firm's financial stress. The land is located in Somerset County, this state, and in Preston County, W. Va.

#### WEST VIRGINIA

**Charleston**—It has been unofficially announced following a meeting of the New River and Winding Gulf Coal Operators Association that an advance of somewhat more than 5 per cent. will be given miners in the region where the association members operate.

The State Department of Mines in its report for February showed 33 fatal accidents throughout the state. McDowell County leads the list with 15 fatalities, of which nine were the result of falls of roof and coal. Fayette County had six fatal accidents, Marion three, Kanawha two, Preston two, Logan one, Mingo one, Putnam one, Raleigh one and Wyoming one. Seven fatalities were the result of the victims being struck or run over by mine cars, two the result of motor accidents, one was reported as a shaft accident and one was unclassified. Of the total number reported, 21 victims were American and 12 were foreigners.

**Montgomery**—Thirty-six coke ovens at the Brooklyn mine of the Scotia Coal and Coke Co. are being repaired to be put in blast within the next few days making foundry coke.

**Sun**—The New River Collieries Co. has contracted with the Diamond Construction Co. of Huntington for 25 first-class miners' dwellings, and will let the contract within a few days for a new hotel. It will also build a modern amusement hall with bowling alleys, billiard rooms, etc.

**Sullivan**—The Piney Coking Coal Land Co. has leased 14,000 acres of its holdings on Piney, Stone Coal and Tommy's Creeks, fourteen leases in all, and railway building to transport the coal is nearing completion.

#### TENNESSEE

**Knoxville**—It is announced by E. B. Sutton, Government Mine Engineer of the Southern District, that the new Mine Rescue Station at Jellico, Tenn., will be ready within a couple of weeks. This station will occupy the second floor of the new Post Office Building.

**Bristol**—It is understood that the Clinchfield Coal Corporation will pay to local people \$100,000 in satisfaction of claims to certain interests in Russell County, Virginia, coal lands, valued in all at about \$10,000,000. The company purchased the lands several years ago, and the present arrangement is for the purpose of clearing a cloud in the title arising out of an ante-nuptial agreement made by the former owner.

#### KENTUCKY

**Lexington**—An eight weeks' course in practical mining, mapped out by C. J. Norwood, head of the State Bureau of Mines, and T. J. Barr, head of the College of Mines and Metallurgy, will open at the State University, Apr. 3. It is designed for operators, mine foremen and workers. The Board of Examiners of the State Board of Mines will meet on May 29, thus making it possible for workers taking the course, who desire to do so, to take the examination for mine foreman. The course will afford instruction in laying out workings, blasting, handling explosives, ventilation, drainage, mine gases, safety lamps, rescue and relief work, mining laws and the like.

**Barbourville**—John E. Shepherd, of Covington, Ky., has been named receiver of the Brush Creek Mining and Manufacturing Co., one of the larger operations in the Brush Creek district of Knox County. The company was placed in a receiver's hands at the instance of bondholders. The Brush Creek company has for several years been in litigation over an adjustment of freight rates and a favorable decision, expected shortly, would establish the mining operations on a paying basis, it is claimed.

#### OHIO

**Cadiz Junction**—Considerable interest has been aroused in eastern Ohio by the announcement that the Elmer W. Mittenger Co., of Philadelphia, has leased from T. E. Johnson 327 acres of coal lands in Jefferson County. The feature of the deal is that the coal involved is 560 ft. below the No. 8 vein and has been thoroughly tested by 36 drillings. It has been ascertained that the vein is workable at a profit. The price paid was \$25 per acre. Other leases of this character are expected in this vicinity.

**Corning**—James H. Pritchard, Chief Inspector and Safety Commissioner of Mines, accompanied by a number of his assistants, opened the sealed mine of the Corning Mining Co., last week. This mine caught fire Feb. 16 and was immediately sealed up after every effort to extinguish the blaze failed. Lack of work among the miners of the district caused an effort to open the mine to be made earlier than usual in those cases. It was found that the fire in the old part was still burning and a brick wall was erected to seal it off. The other part will be placed in operation at once.

#### ILLINOIS

**O'Fallon**—The three coal mines and the farm and town property of the Joseph Taylor Coal Co. are to be sold by E. H. Smiley, the receiver, under an order of the St. Clair County Circuit Court. The order was made at the request of Receiver Smiley. He told the court that the company has liabilities of \$100,000 and less than \$100 with which to pay its debts. The properties of the company are estimated to be worth \$180,000.

**Duquoin**—An explosion of gas in the Paradise mine, near here, recently killed Frank Ellis and John Kranush, shift hands, and injured a third man. A pocket of gas is said to have been ignited by the uncovered lamps of the miners.

**Belleville**—Eight coal mines, together with the equipment and coal-land holdings and leases of the Southern Coal, Coke and Mining Co., a \$2,000,000 corporation, which bought up this group of mines near Belleville ten years ago, will be sold under the hammer at the front door of the Courthouse in Belleville, Apr. 13, by order of the Circuit Court. When the merger of these mines was made, the Belleville Savings Bank and Belleville investors took \$250,000 worth of stock. A reorganization followed, in which the Belleville investors were asked to exchange their original stock for new certificates. They refused, and when interest was defaulted on the original holdings brought foreclosure suits.

**Hillsboro**—The Burnwell Coal Co. is defendant in three suits, which have been filed here for damages on account of the settling of the surface above the company's mine. The plaintiffs are Edward Whitely, Michael Campion and Samuel Boyle, all of Witt. They allege that the company mined its coal under lots owned by them in such a manner that the surface settled 5 ft. Whitely and Campion ask \$2,500 each and Boyle wants \$2,000.

**Nokomis**—It is believed that the Nokomis mine recently broke the record for the State of Illinois by hoisting 5,801 tons during one working day.

#### OKLAHOMA

**McAlester**—R. W. Dick, warden of the Oklahoma State Penitentiary, J. Roy Williams, editor of the "McAlester News-Capital," and Capt. A. S. McKennon have gone to Washington to work in behalf of the resolution in Congress to have the Interior Department offer for sale the coal and asphalt deposits under the restricted Indian lands in eastern Oklahoma.

**COLORADO**

**Glenwood Springs**—The shutdown of the South Canon Co.'s coal mine near here has closed one of the old coal-mining camps in Colorado. Between 60 and 70 miners are idle. The mine will be permanently abandoned according to a statement made by company officials here.

**Trinidad**—The Starkville mine, the second oldest Colorado Fuel and Iron Co. property in the Trinidad district and which has been shut down since the beginning of the Colorado coal strike, Sept. 23, 1913, has resumed operations. The first cars of coal were taken out Mar. 13. A force of 120 men are employed. One hundred of the three hundred coke ovens have been fired. The Starkville mine has an output in normal times of 1,200 tons a day. The mine will be worked regularly and the remaining coke ovens are to be fired within a few days.

**Louisville**—Albert E. Oliver, superintendent at the Monarch No. 2 mine, Louisville, Colo., was given a hearing, Feb. 21, before the Industrial Commission on the charge of an employee who claimed to have been discharged because he would not turn over to Oliver a portion of his earnings. About 20 witnesses were examined without substantiating the accusation. Oliver's exoneration was accompanied by a notice to all parties that no such case would again be considered until the complainant could show in advance his ability to produce substantial evidence.

The Matchless mine, at Louisville, northern district, was the scene of a strike, recently, of about 80 miners, who refused to be lowered or hoisted by the hoistman, who had previously carried several groups of miners a short distance above the shaft collar. The Industrial Commission ordered his discharge and a competent engineer quickly took his place.

**Denver**—The recently established chair of Safety and Efficiency Engineering at the Colorado School of Mines proposes to inaugurate night schools in the various coal camps with the object of teaching foreigners to read and write English; to teach miners methods of safety, timbering and ventilation, explosives, mine gases, fires, laws and sanitation; to train miners in first-aid and rescue work; and to, in every way, render assistance to the men along any line requested to the end of making them more efficient to themselves and to their employers. As this work will be under the supervision of Dr. J. C. Roberts, for years with the Federal Government in this sort of work, it seems assured that it will meet with success.

**PERSONALS**

John Shannahan, of Staunton, Ill., has been elected County Mine Inspector for Macoupin County, to succeed Peter Mehan, deceased.

A. K. Cosgrove was recently chosen vice-president of the Lenox Coal Co. to fill the vacancy caused by the resignation of H. A. Stauffer.

B. T. Cavannah has resigned his position as office manager of the Consolidation Coal Co., at Van Lear, Ky., to take charge of the office of G. L. Walkenshaw, at Blair, W. Va.

J. F. Welborn, president of the Colorado Fuel and Iron Co., who left Colorado recently for New York for a conference with officers of the company, is now in Florida for a brief vacation.

George Kingdon Parsons, Consulting Engineer, has located an office in the Equitable Building at 120 Broadway, New York City, in addition to an office in the Riggs Building, Washington, D. C.

Thomas McFarlane, for the past nine years foreman at Consolidation Mine No. 1, has tendered his resignation and will be succeeded by Christopher Roberts, who has been foreman at No. 8 for the past few years.

Neil Robinson, of La Follette, Tenn., president of the La Follette Coal and Iron Co., who has been in Florida for several weeks past recovering from a serious attack of heart trouble, is much improved and is expected back at La Follette soon.

N. V. James, secretary and treasurer of the War Eagle Coal Co., of Louisa, Ky., and secretary and director of the Thacker Coal Mining Co., of Mingo County, West Virginia, has been seriously ill with Bright's disease at the Booth Memorial Hospital, Covington, Ky.

President W. J. Richards, of the Philadelphia & Reading Coal and Iron Co., on Mar. 17 announced the appointment of George S. Clemens, of Pottsville, as consulting engineer of the company, a new position. Charles Enzian, formerly em-

ployed by the Government in the Bureau of Mines, has been appointed mining engineer of the Shenandoah and Mahanoy divisions.

**OBITUARY**

David Reese, of Elden, Iowa, recently elected president of the Iowa Coal Co., died at Oskaloosa, Mar. 14. Mr. Reese had been connected with several successful mining ventures and was well and favorably known throughout Iowa.

Thomas Evans, a mining expert and part owner in the Kohinoor Coal and Coke Co., of West Virginia, died recently at the home of his daughter in Pottsville. Before becoming associated in the West Virginia district he was for a number of years superintendent of the Oak Hill colliery, near Pottsville.

Joseph Ditchfield, a former superintendent for the Philadelphia & Reading Coal and Iron Co., died recently at his home at Trevorton, Penn. Mr. Ditchfield came into the coal region early in life and finally became the owner of his mine. He also took a prominent part in crushing the notorious Molly Maguire organization.

John H. Hoffman, a veteran of the Civil War and for many years outside foreman at the Hampton mine of the Lackawanna Coal Co., died recently at his home in Scranton as the result of a paralytic stroke at the age of 70 years. Mr. Hoffman was retired on a pension five years ago. On Apr. 5, 1864, Mr. Hoffman enlisted in Company G of the 116th Regiment of Pennsylvania Volunteers, and was mustered out in Washington, D. C., on July 4, 1865. He is survived by his widow, three children and two half-brothers.

Capt. H. S. Chamberlain, president and founder of the Roane Iron Co., which owns and operates large coal mines and coke ovens at Rockwood, Tenn., died at his home in Chattanooga on Mar. 15, at the age of 79. He had recently passed through an operation for the amputation of his leg, made necessary by blood-poisoning. Captain Chamberlain organized the Roane Iron Co. in 1868, which purchased large tracts of coal and mineral land in eastern Tennessee. The company built the first coke furnace south of the Ohio River. It also operated large rolling mills. It is now capitalized at \$1,000,000. Captain Chamberlain was born in Franklin, Ohio, in 1835. He enlisted as a private in the Union Army at the outbreak of the Civil War and rose to the rank of captain and quartermaster. At the end of the war he leased a small rolling-mill at Knoxville, which he used for army supplies, and with this start he advanced rapidly in commercial life. At the time of his death he was interested in nearly all of the important industries of eastern Tennessee. He was president of the Associated Charities of Chattanooga and prominent in many organizations.

**TRADE CATALOGS**

**Bacharach Instrument Co.** "Pocket CO<sub>2</sub> Recorder." Illustrated leaflet, 6x9 in.

**The Penberthy Injector Co.**, Detroit, Mich. "Penberthy." Illustrated, 80 pp., 6x9 in.

**The Buffalo Wire Works Co.**, Buffalo, N. Y. Catalog No. 8. Illustrated, 175 pp., 8x10½ in.

**The Miller Supply Co.**, Huntington, W. Va. "The Friction Rail Brake." Illustrated, 20 pp., 9x6 in.

**The Underfeed Stoker Co. of America**, Chicago, Ill. "The Jones Stoker." Illustrated, 32 pp., 6¾x10 in.

**Yarnall-Waring Co.**, Philadelphia, Penn. "The Log Book of the Power Plant." Illustrated, 88 pp., 6x9 in.

**The General Electric Co.**, Schenectady, N. Y. "Arc Circuit Voltage Indicator." Illustrated, 2 pp., 8x10½ in.

**J. M. & O. R. Johnson**, Ishpeming, Mich. "Hoist Recorders for Mines, Elevators and Furnaces." Illustrated, 5 pp., 6x9 in.

**The Aero Pulverizer Co.**, 120 Broadway, New York. Bulletin 22. "Pulverized Fuel Combustion." Illustrated, 6 pp., 6x9 in.

**The General Electric Co.**, Schenectady, N. Y. "Incandescent Headlights for Street Railway Service." Illustrated, 12 pp., 8x10½ in.

**The Ohio Brass Co.**, Mansfield, Ohio. "Electric Railways, Mine Haulage, and Power Transmission." Illustrated, 24 pp., 5¼x8 in.

**Girtanner-Davies Engineering and Contracting Co.**, St. Louis, Mo. "The Girtanner-Davies Ash Removal System." Illustrated, 12 pp., 4x8 in.

**The Novo Engine Co.**, Lansing, Mich. "Novo Gasoline Engines. Contractors' Equipment and Pumping Machinery." Illustrated, 64 pp., 6½x9 in.

**The Webster Manufacturing Co.**, Tiffin, Ohio. Catalog No. 42. "Machinery for the Handling of Materials and Products." Illustrated, 520 pp., 6x9 in.

**General Electric Co.**, Schenectady, N. Y. "Double-beam Section Insulator." Illustrated, 2 pp., 3½x6 in. Also the "Form K Trolley Frog." Illustrated, 4 pp., 3½x6 in.

## INDUSTRIAL NEWS

**Pittsburgh, Penn.**—The Asbestos Protected Metal Co., of Pittsburgh, announces the opening of a new office in the Praetorian Building, Dallas, Tex., with T. R. Galey as manager.

**Bluefield, W. Va.**—The Appalachian Power Co. recently closed a contract with the Clinchfield Coal Corporation at Dante, whereby the power company will furnish power to the coal mines.

**St. Louis, Mo.**—Officials of railroads operating eastward from Chicago and St. Louis still report a shortage of cars at a number of the larger distributing points and that the movement of freight is practically on a record basis.

**Buffalo, N. Y.**—The Interstate Commerce Commission has suspended till July 4 the increase of 10c. a ton on coal from mines on the Bessemer & Lake Erie R.R. to eastern New York and New England points, the coal passing through Buffalo.

**Chattanooga, Tenn.**—The United States Cast Iron Pipe and Foundry Co. announces the removal of its Southern sales and traffic offices from Chattanooga, Tenn., to 1002 American Trust and Savings Bank Building, Birmingham, Ala. This change becomes effective Apr. 1, 1916.

**Philadelphia, Penn.**—The Norwegian steamship "Froede" has been chartered to carry 3,000 tons of bituminous coal from Hampton Roads to Buenos Aires at a price of \$20 per ton, this rate being the highest ever recorded for carrying coal to this point from the Atlantic seaboard.

**Philadelphia, Penn.**—The Lehigh Coal and Navigation Co., it is announced, will appeal from the verdict of the Federal Court at Trenton, N. J., finding the company guilty of 27 counts in an indictment of accepting rebates from the Central Railroad of New Jersey on coal shipments over the Lehigh & Susquehanna Division.

**Buffalo, N. Y.**—The Erie Railroad Co. has canceled its tariff providing for the loading of coal over its Buffalo lake trestle by the Delaware, Lackawanna & Western Coal Co., thus cutting off the latter's operations for the present, as its own trestle has been torn down by government order and will not be rebuilt till midsummer at the shortest.

**Prestonsburg, Ky.**—The Beaver Pond Coal Co. and the Big Sandy Consolidated Fuel Co. have been made defendants in an action for foreclosure and receiver brought by the Provident Savings Bank and Trust Co., of Cincinnati, in the United States District Court. It is charged that they defaulted in the payment of interest on a \$25,000 bond issue.

**Denver, Colo.**—Experiments which have been carried on within the last few months, have demonstrated that the northern Colorado coal will produce more gas than southern coking coal, which has been used for that purpose. This, it is said, will reduce the price of gas and will be of benefit both to the consumer and to the manufacturer.

**Boston, Mass.**—It is reported that the New England Coal and Coke Co. has recently chartered its steamer "Newton" to carry coal to Argentina and return with general cargo at a figure close to \$50,000 per month. She was due at Lambert's Point, Va., the early part of the week beginning Mar. 20, where she will load 7,000 tons of coal for Buenos Aires.

**Pittsburgh, Penn.**—The Asbestos Protected Metal Co. announces the opening of a new office in the Hurt Building, Atlanta, Ga., with J. H. Nichols as manager. Mr. Nichols has been associated with the Asbestos Protected Metal Co. for a number of years at the Chicago office, and for the past six months has been located at the main office of the company.

**Pottsville, Penn.**—The past week witnessed improved conditions in the car supply to the collieries of this district, many of which have been shut down part of the time during the last several months. For the first time in many weeks

sufficient cars were received to keep all operations on full time and the outlook is that this condition will prevail until Apr. 1, at least.

**Frankfort, Ky.**—That two drivers of mule cars hauling coal out of different entries in a mine are not fellow servants is the opinion handed down by the Kentucky Court of Appeals in sustaining a \$3,000 verdict for damages awarded Shelby Robertson, a driver, for the loss of his hand in a collision between two coal cars in a mine of the McHenry Coal Co., near Echols, Ky.

**Columbus, Ohio.**—Probable suspension of the \$1 coal rate between Nelsonville and Toledo, filed recently with the public utilities commission by the Hocking Valley R.R., was intimated by the commissioners. The commission has under consideration the request of the Sunday Creek Coal Co. and the United Mine Workers that the rate be cut even below 85c. The railroad proposes that the \$1 rate be effective May 5.

**Birmingham, Ala.**—Hilton E. Carr recently filed suit in the circuit court against A. N. Cleave, executor of the estate of the late Col. Robert H. Sayre, to compel the Sayre Mining Co. to transfer to him 15,000 acres of coal land in Alabama, together with improvements of a value of \$400,000 for a consideration of \$1,000,000. He alleges that a contract was entered into several months ago for this deal, but that it has not been fulfilled.

**Bluefield, W. Va.**—During the month of February, the Norfolk & Western R.R. moved 2,554,376 tons of coal, this being a decrease of 99,033 tons as compared with January shipment but an increase of 933,355 tons over February of 1915. Should the present rate of increase in shipments continue throughout the year, the Norfolk & Western tonnage in 1916 would exceed that of 1915 by over 10,000,000 tons, making the shipments for the year over 40,000,000 tons.

**Wheeling, W. Va.**—The Fairpoint Coal Co. with large holdings east of Edgington Lane recently secured an option on the Kruger Estate near Wheeling Park. It is said that this company contemplates sinking a shaft on the property and will make it the outlet for coal to be shipped to Eastern markets. While preparations are being made, negotiations will be started with the West Virginia Traction Co. for furnishing transportation facilities to Elm Grove.

**Frankfort, Ky.**—Exoneration of charges of bribery of members of the Kentucky Senate in the matter of the unsuccessful attempt to divide Pike County, Ky., was given by an Investigation Committee and approved by the Senate. The charge had been made that West Virginia coal operators were seeking the division of Pike County, which is in the eastern Kentucky coal-mining section. The committee reported that rumors and gossip were unwarranted and without foundation.

**Norfolk, Va.**—The Chesapeake & Ohio R.R. showed an increase of 552,861 tons of bituminous coal in January, originating from the mines on its lines. The total tonnage for the month was 2,214,471 tons, and for the seven months of the fiscal year the total tonnage is 15,114,276, which is an increase of 2,423,329 tons over the corresponding period of the previous year. With the continuation of the present demand for coal it is likely that the company by the end of the year will show the largest tonnage in its history.

**Bluefield, W. Va.**—The case of Captain F. M. Imboden against the Clinchfield Coal Corporation et al., one of the most famous land cases in the history of Virginia which has occupied the attention of the various courts of the state for several years, and was appealed to the State Supreme Court last spring, has been decided by compromise between the parties to the litigation. The amount paid by the defendant corporation is something over \$100,000. This amount will be paid over when the Circuit Court of Russell County has approved the compromise which is expected to be in about 60 days.

**Washington, D. C.**—The United States Civil Service Commission will hold an open competitive examination Apr. 4, 1916, by the results of which eligibles will be secured for the position of natural gas engineer at a salary of \$1,800 to \$2,500 per annum. The duties of this position will be to participate in the engineering and economic work of the Bureau of Mines in relation to the production, transportation, distribution and utilization of natural gas throughout the United States, with special reference to the prevention of waste and the improvement of methods used in the industry. Applicants will be rated upon their education, engineering experience, reports or designs, etc. They must also be between the ages of 21 and 40 on the date of examination. Those who meet the requirements and desire this examination should at once apply for form 2118, stating the title of the examination desired, to the United States Civil Service Commission, Washington, D. C.

## Market Department

### General Review

**Anthracite companies breaking all previous tonnage records for March. Bituminous market decidedly mixed and much upset by railroad congestions. Lake shippers concerned over the scarcity of coal. Middle Western market softer but higher prices are noted on new contracts.**

**Anthracite**—The remarkably cold weather has resulted in a record-breaking month in the hard-coal trade this year. Ordinarily March is a month when individuals raid the markets with unlimited tonnages at the April circular or less, forcing the big interests to curtail operating schedules heavily, but the latter are now hard pressed to meet the urgent demand coming from all quarters. Buyers who had decided to slow up on their purchases, are again urgently in the market, while others who had planned to carry full stock Apr. 1 are finding their storage piles rapidly decreasing and are pressing shippers hard for additional tonnage. There is a particular shortage of steam grades, on which agencies are unable to make any satisfactory promises as to deliveries, and some fancy prices are occasionally noted for odd lots.

**Bituminous**—The bituminous situation is decidedly mixed due chiefly to transportation difficulties. Railroad embargoes have, if anything, become more general and consumers in the affected districts who are forced into the spot market to fill out their requirements, find themselves obliged to pay fancy prices. On the other hand reactionary tendencies and declining prices are noted in districts where the movement is free, these markets being compelled to absorb the surplus tonnage intended for those sections where embargoes prevail. Buyers generally are not evincing much interest in the market, apparently confident of being able to obtain adequate supplies. Shippers, however, report good orders on hand, while they anticipate an active market ahead, and are not inclined to commit themselves too far into the future. There are undoubtedly strong constructive factors in the market, such as the uncertainty concerning the central Pennsylvania and the anthracite wage conferences, the collapse of either or both of which would undoubtedly have a stimulating effect on the general soft-coal trade.

**Exports**—Export inquiries are plentiful, but the high ocean freights are making it impossible to conclude much business. There has been no letup to the constantly advancing ocean freights, and tonnage at the moment is even somewhat scarcer than usual. Delays in vessel arrivals at Hampton Roads has resulted in another large accumulation of coal there, but many of the overdue vessels are now in port, which, together with those due this week, will absorb a large tonnage. Dumps for last week showed a substantial increase.

**Ohio Valley**—The market is not active but is generally well maintained, the chief weakness noted being due to the releasing of considerable tonnages accumulated in anticipation of a possible suspension of mining. The situation is undoubtedly stronger than is ordinarily the case immediately preceding the opening of Lake shipping, and operators seem to be justified in their optimistic position now that the Lake season is at hand. However, buyers do not agree with the stiffer attitude of the agencies as concerns new contracts, and there is a general tendency to delay negotiations on these, pending more definite developments. In the meantime Lake vessels are being whipped into shape and shippers are evincing concern over the scarcity of coal due to the transportation difficulties.

**Middle West**—Mild spring-like weather, restricting the domestic consumption, supplemented by the cessation of the storage orders, has caused a definite softening tendency in the market. Many of the steam consumers are beginning to pick up surpluses accumulated in anticipation of a suspension of mining while the domestic consumption has practically ceased entirely. Uncertainties are the predominate note in negotiations on new contracts, due in part to the fact that the extent of the wage increases is indeterminate as yet in some districts. It is clear that the question of prices will be very bitterly contested by both sides, but it is generally agreed that a higher level will be fixed upon.

**A Year Ago**—Large anthracite companies going on full working schedules to meet the heavy demand at the spring circular. Contracts on bituminous are lower than in previous years. Prompt market is slack in all directions. Discouraging outlook in the Lake trade.

### Business Opinions

**Boston News Bureau**—Although the peace rumors of Monday seem to have no basis in fact, they gave financial sentiment quite a shock. It was the first real peace scare and it came at a time when prices had advanced, when the public was again becoming interested, and when the short interest had been materially reduced. It therefore showed the weak technical condition. We are apparently in a period when people are beginning to have their doubts as to whether we are to continue to receive big foreign orders at high prices. Actual conditions may prove that these fears are not well based. The peace talk may be caused to better the placing of foreign loans here, or it may be nothing beyond an effort to start a stock-market liquidation. But we are evidently coming to a time when peace talk will be more common and probably more effective. The theory is gaining ground that labor conditions are slowly adjusting themselves. As to money, it is evident that the supply continues to exceed the demand. Moreover, we must remember that millions and millions of dollars in dividends and interest will now remain here that otherwise would have gone abroad had not foreign-held securities been sold.

**Iron Age**—Rail buying on a large scale for 1917 is the outstanding feature of the market. The railroads pay no more than they have paid for years, and the placing of their orders now involves no risk and no judgment on the duration of the double and treble prices current for other forms of steel. Probably the total of recent lettings is 450,000 to 500,000 tons. While the railroads are thus looking ahead, and there is heavy forward buying for vessel work, no less than 200,000 tons having been taken for that purpose in the past week, there are signs that not all manufacturing buyers are being stampeded by the rapid advances. At Pittsburgh, while there is no less scrambling for early shipments, some manufacturing consumers show more willingness to hold off and take a chance on the market of six to nine months hence.

**Dun**—Only by the use of superlatives can existing commercial and industrial conditions be adequately described. Great as are the gains shown by bank clearings, iron output, unfilled steel tonnage and similar indices, mere statistical records no longer fully reflect a situation for which there is no precedent. In some branches and sections the volume of business has reached such vast proportions that further expansion is dependent upon increased facilities for both production and distribution. Commercial failures this week are 327 against 377 last week, 380 the preceding week and 537 the corresponding week last year.

**Bradstreet**—Well-nigh insatiable demand for practically all kinds of goods continues, necessity seemingly overriding the supposed power of steadily rising prices to automatically check consumption. Higher quotations fail to deter orders from rolling into the steel mills; big foreign orders are reported pending; advices of lack of materials match reports of short supplies of freight cars; there is more general business under way, notwithstanding that inclement weather in the east has retarded retail trade in spring fabrics; money is in better demand and savings deposits are of record proportions.

**American Wool and Cotton Reporter**—Strength but quietness still prevails. The market is bound to be strong for several months to come, according to every indication. The wool growers in the West for the most part are holding firm. It is a seller's market from the wool on the sheep's back to the goods market. Woolen goods are somewhat less active than in previous weeks. Considerable business, however, has been transacted. Even with advances of from 35 to 50% over prices of a year ago an enormous business has been put through. It is now very evident that there will not be any great cancellation, at least nothing like the proportion in ordinary seasons.

**Marshall Field & Co.**—Wholesale distribution of dry goods for the week shows a very large increase over the same period a year ago. Road sales for both immediate and future delivery are continuing in heavier volume. Customers have been in the market in greater numbers. Collections are normal. The cotton and silk markets are strong and prices advancing.

## ATLANTIC SEABOARD

### BOSTON

**Mixed situation in Pocahontas and New River; cold weather increases consumption and buyers try to avoid entering the market. Prices steady, but Hampton Roads accumulations large. Pennsylvania operators inclined to modify prices. Anthracite receipts still far behind.**

**Bituminous**—Pocahontas and New River are in plentiful supply at the Hampton Roads piers and dispatch continues excellent. Apparently there are no troubles with car-supply or movement along the Virginia railroads and the latter may be counted on to keep coal coming as fast as the terminals can dump it, a situation quite different from that at other ports. On the other hand spot f.o.b. business is very light and no marked change is in sight. Prices continue at \$2.80@2.85. Bottoms are still hard to get, and outside of regular shipments on contract there is practically no movement coastwise. Offshore demand continues fairly steady.

The market in New England is in odd shape. The few consumers or dealers who have been forced into the market the past week have had to pay high for transportation. Carries on the market, however, would probably meet with poor sale. If the cold weather keeps on and those shippers who have undertaken to make deliveries beginning Apr. 1 are at all slow about meeting demands on them an active spot market will probably develop. Meanwhile buyers will not show any interest unless they are absolutely obliged to, the margin is so great between the contract coal due them in April and supplies at the current market price.

At distributing points a similar condition prevails. Prices for spot coal are high, \$5.25@6 for Pocahontas and New River on cars, but sales are only for hand to mouth quantities. Shortage of locomotives and congestion of traffic at points near tidewater prevents anything like prompt service. At the same time embargoes are effective against two or three of the larger railroads all-rail. The dealers and consumers who are caught between the two conditions find it extremely hard to get coal. The New Haven railroad has on its tracks 53,000 cars at the present time, where 37,000 is the maximum for efficient movement. The discouraging part of it is that no improvement is in sight.

No change is observed in Georges Creek. Baltimore is the only port where there are any shipments of consequence and there the detention is such that the principal shippers are continuing to load most of their transportation at Hampton Roads. Prices for the new contract year have not been announced as yet.

Shippers of the Pennsylvania grades are gradually modifying their ideas of contract prices as they come to understand the state of trade here. A number of the agencies are behind in deliveries on contracts made a year ago and since these are the more aggressive factors in the market here very little new business is expected to develop until the season is farther advanced. All the Pennsylvania bituminous coals are very much at a disadvantage in New England this year, especially at tidewater. A very small proportion of the tonnage is freighted under the control either of buyer or seller, and this is certain to be a hard year for the merchant who depends for his boats on the open market.

**Anthracite**—If dealers in the larger cities had not deliberately laid out to get extra shipments during the early winter in anticipation of difficulties Apr. 1, this market would now be in a bad way. As it is, what small reserves were accumulated are being rapidly depleted by the prolonged winter weather. Hardly a tidewater dealer but is out of certain kinds and sizes. At the same time no premium coal seems to be offering. Outside freights have again got so high that there is small inducement to individual shippers to send forward what odd sizes can be had. Brisk city demand, congestion at the loading piers, and slow dumping, have combined with the exasperating movement of boats coastwise to make conditions harder than in any recent years. Broken and pea are the sizes in shortest supply, with stove very nearly as hard to get.

Bituminous prices, f.o.b. loading ports at points designated, are about as follows, per gross ton:

	Philadelphia	New York	Baltimore	F.o.b. Mine
Clearfields.....	\$2.60@3.00	\$2.90@3.30	.....	\$1.35@1.75
Cambrials and Somersets.	2.80@3.25	3.10@3.55	.....	1.55@2.00
Georges Creek... ..	3.75@3.85	4.00@4.15	.....	.....

Pocahontas and New River are quoted at \$2.80@2.85 f.o.b. Norfolk and Newport News, and on cars at Boston and Providence, \$5.25@6

### NEW YORK

**Anthracite situation hampered by embargoes. Some inland sections nearly bare of supplies. Bituminous active and prices for loaded boats high. Car supply short. Export inquiries frequent but no bottoms to be had**

**Anthracite**—So far as demand and prices go the anthracite situation at Tidewater is booming, but the transportation problem is serious and deliveries have never been more difficult. Embargoes are as stringent as ever and shippers are having difficulty in distributing supplies, especially to inland New England, which is almost bare of coal.

The local trade is being taken care of although loading at the piers has been slow owing to frozen coal. There is plenty of domestic sizes to meet all demands but the steam coals are short. No word having come from the companies regarding the usual spring reduction of 50c. per ton for prepared coals, dealers are not placing the usual spring orders. A year ago dealers were buying coal at April prices but domestic coals are now held at the full company circular except on some stray lots of individual coal which have sold 10c. off on egg and 20c. off on nut.

The steam coal situation is serious; there is a shortage of these sizes and some shippers are not promising deliveries before ten days at the earliest. In some instances fancy prices have been paid for buckwheat No. 1, quotations for loaded boats being as high as \$4.75.

Current quotations, gross tons, f.o.b., Tidewater at the lower ports follow:

	Circular	Individual	Circular	Individual
Broken.....	\$5.05	Pea.....	\$3.50	\$3.50@4.00
Egg.....	5.30	Buck.....	2.75	3.50@4.00
Stove.....	5.30	Rice.....	2.25	2.65@2.75
Nut.....	5.55	Barley.....	1.75	2.30@2.40

Quotations at the upper ports are generally 5c. higher.

**Bituminous**—Demand for bituminous coal is active but the trade in the eastern section of the country is tied up by embargoes. This is particularly true of New England where there is a scarcity of supplies. The result is that New York agencies are being urged to make water shipments. The chief feature at Tidewater has been the fancy prices quoted for alongside deliveries. Loaded boats find a ready market, conditions at the piers making it impossible to load freely.

Quotations to inland points not affected by embargoes are easy and demand fairly active. The situation at the mines continues unsatisfactory with cars and labor short. Shippers are not closing many contracts, most of them preferring to wait until the new working agreement, for the Central Pennsylvania district is decided upon. Quotations for new business are usually 25 to 30c. above last years prices.

Prices quoted for loaded boats range from \$4.25 to \$4.75, while the same coals are quoted at from \$3 to \$3.75 f.o.b.

Exporters report plenty of inquiries as to prices and supply but when it comes to a question of securing vessels there is no closing of contracts. Bottoms are very scarce and for those available excessive freight rates are asked.

Current quotations, gross tons, f.o.b., Tidewater follow:

	South		Port	Mine
	Amboy	Reading	St. George	Price
Georges Creek Big Vein..	\$3.75@1.00	\$3.75@4.00	\$3.75@4.00	\$2.25@2.50
Georges Creek Tyson....	3.50@3.75	3.50@3.75	3.50@3.75	1.95@2.20
Clearfield; Medium.....	3.25@3.50	3.25@3.50	.....	1.70@1.95
South Forks.....	3.50@3.75	.....	.....	1.95@2.20
Nanty Glo.....	3.35@3.60	.....	.....	1.80@2.05
Somerset County: Medium.....	3.25@3.50	3.25@3.50	3.25@3.50	1.70@1.95
Quemahoning.....	.....	3.45@3.60	3.45@3.60	1.90@2.05
West Virginia Fairmont 1.....	3.10@3.20	3.10@3.20	3.10@3.20	1.35@1.45
Fairmont mine run.....	3.00@3.10	3.00@3.10	3.00@3.10	1.15@1.25
Western Maryland.....	3.00@3.25	3.00@3.25	3.00@3.25	1.45@1.70

### PHILADELPHIA

**Remarkable weather boosts anthracite. Big March tonnage. Prepared sizes very active. Heavy demand for steam grades. Dealers anxious about tax refund. Bituminous unchanged, but advance expected.**

**Anthracite**—Some remarkably cold weather, for March, has resulted in the busiest the trade ever experienced at this time. The retail man is working at maximum capacity and the wholesalers are hard pressed to fill orders. Usually at this time of the year the individuals flood the market with coal at the April circular or 50c. below the prices of the large companies, who as a consequence are forced to curtail working schedules heavily. As it is the big interests are working full time, except when empty cars are not available and they have been able to dispose of their entire production at the full circular. The individuals have found it difficult to take care of their output and maintain prices, the trade in general being disposed to favor the big shippers. The dealers who had decided to slow up on their purchases are increasing requisitions and the buyers who had determined on carrying capacity stocks into April are pressing the shippers for all sizes while in the meantime their storage piles are constantly shrinking.

Broken coal continues in a strong position and will no doubt maintain its present pace until the anticipated suspension. Every car that does not have to be applied on a contract at \$3.35 finds a ready buyer at the circular price of \$3.60. The March demand for egg coal has been remarkable and the companies in particular have a waiting market at \$3.85. The production of stove is also well sold at \$4.10 and the demand is sure to remain strong for the next several weeks. Chestnut at \$4.25 is firmer than early in the month, but while the demand calls for the entire production it does not warrant drawing on the immense storage piles for any noticeable tonnage.

There is an urgent demand for pea coal. The stocks of this size are getting so short that the dealers who thought they were comfortably supplied are now becoming alarmed; the demand is really remarkable and there would not be a pound in the storage yards today had it been possible to procure cars to move it. It seems the only time the yards can really get a supply of cars is on Sunday, and this week one of the large companies was unable to secure labor, even at double rates, to work at the yards on account of the extremely cold weather. Yet despite the demand the price does not advance above the circular of \$2.55. The orders have piled up until with the present limited car supply it is an impossibility to satisfy some of the best trade. All along the big shippers have promised to fill this gap from the storage yards, but they have now about given up hope and may refuse further business on this size.

Both operators and retail dealers are cheered by the unusually good collections. People are paying promptly for their coal, and the trade is really enjoying a period of prosperity compared to what they are accustomed to.

The steam coals continue in most active demand, particularly buckwheat, and the difficulties were increased this week by the railroads confiscating quite a tonnage of this size for engine fuel. Rice also continues in big demand, although not so much so as the larger size.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide shipment are as follows:

	Line	Tide		Line	Tide
Broken.....	\$3.60	\$4.85	Pea.....	\$2.55	\$3.30
Egg.....	3.85	5.10	Buckwheat.....	1.55	2.30
Stove.....	4.10	5.10	Rice.....	.90	1.80
Chestnut.....	4.25	5.35	Barley.....	.55	1.30

**BITUMINOUS**—There is little apparent change in the market from the standpoint of prices, with the exception of some Fairmont grades which have run off 5@15c. a ton compared to previous figures; this is due to a large quantity of coal being held in this market by embargoes to the north and east. The situation is rather uncertain, and while shippers report good orders on hand, they are not particularly anxious to increase them, as they feel that a rise in price is imminent. The consumers, however, act as though all mining difficulties are now out of the way, apparently overlooking the fact that the miners of the Central Pennsylvania district, which produces 50% of the coal reaching this market, are yet to be dealt with. Another factor which is causing the seller of steam coals to hesitate is the fact that the anthracite interests have made little progress toward a new agreement. Owing to the embargo at tide coastwise shipments are practically shut off.

The prices per gross ton f.o.b. cars at mines are as follows:

Georges Creek Big Vein..	\$2.25@2.50	Fairmont gas, 1.....	\$1.65@1.75
South Fork Miller Vein..	1.85@1.95	Fairmont gas, mine-run..	1.40@1.50
Clearfield (ordinary).....	1.60@1.70	Fairmont gas, slack.....	1.25@1.35
Somerset (ordinary).....	1.50@1.60	Fairmont lump, ordinary..	1.35@1.45
West Va. Freeport.....	1.40@1.50	Fairmont mine-run.....	1.20@1.30
		Fairmont slack.....	1.25@1.35

#### HAMPTON ROADS

**Export cargoes show some improvement. Government takings fair. Large accumulations on hand.**

The movement from Hampton Roads piers during the past week has improved to some extent. The heaviest coastwise movement has been to Boston and Providence with export cargoes heaviest to Canal Zone and Rio Janeiro. Prices on the standard grades remain practically the same and the accumulation of coal in the railroad yards is somewhat above normal, due largely to vessels failing to arrive on dates originally named. There is a large amount of vessel tonnage in port the early part of the week and with that over due the accumulation will soon be cut down considerably.

A number of vessels loaded at Hampton Roads ports have been lost at sea this winter, the last being the "Kanawha" which loaded 2,906 tons from Newport News for Rio de Janeiro. This vessel was for a number of years employed in the coal trade between Hampton Roads and New England ports but when the war caused such a heavy demand for tonnage she was put into the foreign trade.

**Railroad Tonnages**—Jettippings over the local piers for the past five weeks compare as follows:

Railroad	Week Ending				
	Feb. 19	Feb. 26	Mar. 4	Mar. 11	Mar. 18
Norfolk & Western.....	121,156	156,521	119,920	126,540	142,223
Chesapeake & Ohio.....	71,513	87,450	84,849	75,525	60,412
Virginian.....	92,243	78,463	66,912	68,598	104,810
Totals.....	284,912	322,434	271,681	269,663	307,445

## Ocean Charters and Freights

#### OCEAN FREIGHTS

A number of steamers were chartered for Plate coal during the past week, at from \$24 to \$24.60, with 1,000 tons per day discharge, some of these on regular conditions; and the others with considerable freight in advance without discount. It was reported on Friday last that a steamer was chartered to load coal at Philadelphia for Rio, at \$21 net, but we doubt this report as we are offered steamers at \$1.50 less, for the same voyage. Rates to the Mediterranean are advancing, with but little tonnage offered for this class of business. Cuban rates are also advancing, but rates to the Windward Islands are unchanged.

We would quote freight rates on coal by steamer as follows:

To	Rate	To	Rate
Havana.....	\$4.75@5.00	Bermuda.....	.55.00
Cardenas or Sagua.....	6.00 about	Vera Cruz.....	7.00@8.00
Ciuefugos.....	6.00 about	Tampico.....	7.00@8.00
Port au Spain, Trinidad.....	7.50@7.75	Rio Janeiro.....	19.50* about
St. Lucia.....	7.50@7.75	Santos*.....	19.50* about
St. Thomas.....	7.00@7.50	Montevideo.....	24.60@25.20 <sup>1</sup>
Barbados.....	7.50@7.75	Buenos Aires or La Plata.....	24.60@25.20 <sup>1</sup>
Kingston.....	6.00@6.25	Rosario.....	26.40@27.60 <sup>2</sup>
Curacao.....	7.00@7.25 <sup>3</sup>	West Coast of Italy.....	28.80@31.20
Santiago.....	6.25 about	Barcelona.....	26.40@28.80 <sup>4*</sup>
Guanatamano.....	6.25 about	Valparaiso or Callao.....	
Demerara.....	9.00@10.00	Marseilles.....	27.60@30.00

\* Consignees paying dockage dues. \*\* Spanish dues for account.

<sup>1</sup> 1,000 tons discharge @ .30c. <sup>2</sup> 500 discharge. <sup>3</sup> And p.c. <sup>4</sup> Net, 1,000 tons discharge. <sup>5</sup> Or other good Spanish port.

W. W. Battie & Co.'s Coal Trade Freight Report.

Note—Charters for Italy, France and Spain read: "Lay days to commence on steamer's arrival at or off port of discharge, 24c. per net register ton per day demurrage."

#### COASTWISE FREIGHTS

Marine rates have taken another jump this week, and factors who were counting on a softening market are facing a condition that looks more and more like lasting through the season; \$2.25 has been paid from Norfolk to Sound ports and \$2.50 to Boston, and transportation continues scarce. Certain owners of steam colliers are chartering their ships trip by trip for the present, not caring to tie them up either coastwise or off-shore until there are further developments.

Boats for New York loading have also advanced from 90c. to \$1.25, with a minimum of time guaranteed for loading and discharging.

#### VESSEL CLEARANCES

The following steamers have cleared from various ports during the past week:

NORFOLK		NORFOLK—Continued			
Vessel	Destination	Tons	Vessel	Destination	Tons
Francesco <sup>12</sup>	Civita		Denis <sup>7</sup>	Para and Manaos	801
Am. Transp. <sup>2</sup>	Havana		Ulysses <sup>8</sup>	Canal Zone	12,000
Ranvik <sup>13</sup>	Rio Janeiro	5,000	Achilles <sup>9</sup>	Canal Zone	12,000
Hermod <sup>7</sup>	Curacao	5,500	Columbian <sup>*</sup>	Rio Janeiro	10,780
Daphne <sup>7</sup>	Buenos Aires	4,309			
Winneconne	Pernambuco	2,570			
Burstad <sup>3</sup>	Manzanillo	1,200			
H. Sherwood	St. Michaels	900	Gen. Hubbard <sup>13</sup>	Havana	
Frances Hyde <sup>6</sup>	Guanatamano	887			
R. W. Stevens <sup>13</sup>	Pernambuco	1,660	Kanawha <sup>4</sup>	Rio Janeiro	2,906
Yamato Maru <sup>7</sup>	Buenos Aires	4,606	Pena del Rio <sup>4</sup>	Havana	3,600
B. L. Downs <sup>7</sup>	Para	1,063	Finn <sup>4</sup>	Rio Janeiro	5,000
Urd <sup>6</sup>		4,000	Neptune <sup>4</sup>	Santiago	800
Atwater & Co.	Castner, Curran & Bullitt			New River Coal Co.	
Baker Whiteley	Chesapeake & Ohio C. & C. Co.			Pocahontas Co.	
Barber & Co.	Crozer-Pocahontas Co.			Smokeless Fuel Co.	
Berwind-White	Hasler Brothers			C. H. Sprague & Son	
C. C. Blake Co.	Flat Top Fuel Co.				

#### OCEAN CHARTERS

The following charters have been reported from various sources during the past week

PHILADELPHIA		VIRGINIA	
Vessel	To	Tons	Rate
Daylight	Rio Janeiro	571	H. Palmer
J. E. Drake	Buenos Ayres	789	J. Jones
Dorothy	Bahia	758	Natuna
R. W. Stevens	Pernambuco	1,032	Forde
Tabor	Martinique	2,392	Esther Ann
			Bahia
			Helvetia
			Paro
			Paul Pagh
			River Plate 2,400 \$20.00
			River Plate 1,600 20.00
			River Plate 1,028 16.00
			Rio Janeiro 1,364 20.00
			Bahia 631 14.00
			Paro 424
			River Plate 1,408 24.00

## OHIO VALLEY

### PITTSBURGH

**Spot coal demand light and negotiations on contract proceeding slowly. Labor shortage menaced. Producers optimistic.**

Demand for spot coal continues rather light and the market is far from active. Domestic consumption is heavier than usual for the latter part of March, on account of unseasonably cold weather, but this does not affect the situation materially. Any element of weakness is due to the fact that there is to be no suspension of mining, this releasing the very considerable tonnages of coal that had been stored and causing many consumers to take less on contract than usual. Producers are feeling very hopeful over the outlook, regarding the situation at the moment fully as strong as could be expected in the circumstances, and expecting the opening of the Lake season to bring much stronger market conditions. As a result of this attitude operators are rather stiffer in their views on contract coal than accords with the attitude of buyers and negotiations on contracts are proceeding rather slowly.

The car situation is better; while there are frequent shortages, mining is not interfered with to any extent and it is quite possible a more liberal supply of cars would merely involve a softer market all around. Labor is far from plentiful and is becoming more and more of a problem.

We quote free coal as follows, the range in prices being due chiefly to Pan Handle steam coal being lower than Youghiogheny gas: Slack, \$1.10@1.15; mine-run, \$1.15@1.30;  $\frac{3}{4}$ -in., \$1.25@1.40;  $1\frac{1}{4}$ -in., \$1.35@1.40, per net ton at mine, Pittsburgh district.

### BUFFALO

**Market firm. Anthracite moving better than bituminous. Car shortage growing worse. Consumers asking for contracts but sellers are holding off.**

**Bituminous**—The movement is not heavy, due to the short car supply, the unsteadiness of prices and the growing confidence on the part of the operator and jobber in the future of the market. While this market has not partaken of the excitement reported from Pittsburgh, the Allegheny Valley operators are holding their coal very firm and feel that the outlook is brighter than has been the case for a number of years.

Consumers are making efforts to secure contracts at moderate advances over those of a year ago, but as a rule the sellers are holding off and feel that there is yet much uncertainty as to new prices. There is also the complication of the Lake opening, which always disturbs prices. Slack is stronger than sizes, but it sometimes accumulates at the beginning of the Lake season, so that prices weaken.

The prices made by Pittsburgh operators a short time ago for Buffalo spot sales still hold, but they now apply mainly to contracts. Slack sells at about 25c. above these prices:

	Pittsburgh	Allegheny Valley	Penn Smokeyless
Lump.....	\$2.90	\$2.75	\$2.80
Three-quarter.....	2.75	2.60	—
Mine run.....	2.65	2.50	2.60
Slack.....	2.25	2.20	2.60

Prices are per net ton, f.o.b., except that east of Rochester and Kingston, Ont., they are per gross ton.

**Anthracite**—The demand has been good all the month, due almost entirely to the cold weather. Consumers who had about stopped buying for the season have had to lay in fresh supplies and are still buying extra coal. The uncertainty as to April prices puzzles shippers as well as consumers. Some jobbers are sending out circulars predicting that there will not be any reduction this spring. There is also the doubt as to the proposed change of sizes. The Erie railroad shippers are loading anthracite into Lake vessels and the Lackawanna shippers would do the same if they had a trestle, but there is not much surplus coal on hand. The local trade is good. Wholesale prices continue as follows per gross ton:

	Cars	Vessels		Cars	Vessels
Grate.....	\$5.60	\$5.85	Chestnut.....	\$6.10	\$6.35
Egg.....	5.85	6.10	Pea.....	4.30	4.55
Stove.....	5.85	6.10	Buckwheat.....	3.25	3.50

### TORONTO, CAN.

**Anthracite active. Bituminous quieter with some fluctuations in prices. Good supplies on hand and shipments coming forward more freely.**

Dealers are busy owing to the continuance of severe weather. Anthracite is moving freely though the scarcity

of teamsters considerably retards deliveries. Bituminous is steady though rather quiet. Stocks are well maintained and shipments from mines are moving with less delay. The usual spring reduction in the price of anthracite is not considered likely to be made this season.

Prices have undergone some fluctuations from day to day, present quotations for best grades, per short ton, being as follows: Retail, anthracite egg, stove and nut, \$8; grate, \$7.75; pea, \$6.75; bituminous steam, \$5.25; screenings, \$4.50; domestic lump, \$6. Wholesale f.o.b. cars at destination, bituminous three-quarter lump, \$3.75; screenings, \$3.50; Pennsylvania smokeless lump, \$4.50; Pocahontas lump, \$5.50; slack, \$3.75.

### TOLEDO

**Fear car shortage will hold up Lake movement when navigation opens. Conditions satisfactory from selling standpoint.**

Shippers are beginning to feel some anxiety concerning the early Lake movement, because of the car shortage. Coal boats are being put into good condition and will be ready to start early if cargoes can be provided. Coal is not coming in as it usually does at this season and there is practically nothing on track here at the present time. Coal is already in demand at the upper docks and there will be plenty of business if the railroads can provide sufficient cars to handle it. The demand for steam coal is not specially strong and few contracts are being made. Domestic coal has been selling fairly well owing to some extremely cold weather. Prices are holding well.

### COLUMBUS

**The colder weather has stimulated domestic trade slightly. Contracting for steam tonnage delayed until working conditions are settled. Prices slightly weaker.**

The lower temperatures have caused a spurt in the demand for domestic grades; dealers' stocks are light and additional tonnage is necessary. Practically all of the orders were for immediate shipment. In the rural districts buying is fairly active as farmers are now able to haul coal over the roads. Retail prices have been fairly well maintained despite the slackness in demand and dealers are not inclined to cut in order to force business.

In steam circles trade is rather quiet. Contracting is not active as producers are holding off until the working conditions in the various mining sections are settled. Quite a few contracts expire after Apr. 1 when contracting will be active. Railroads are requiring a large tonnage for the movement of trains.

The prospects for the Lake trade are especially promising. Chartering of boats is now about over and it looks like a season where boats will be hard to get. The ore trade being active will cause many owners to go up the Lakes light. Railroads announce that they will adhere strictly to the five-day free time rule and thus loading of cars for the Lake trade before navigation opens will be stopped.

Pocahontas is selling better and strength is shown in all sections. West Virginia splints are rather weak and prices are declining. Gas coal is much higher than a year ago as contracts have been made at \$1.10 as contrasted to 85c. last year.

	Hock- Pom- East	Heck- Pom- East	
	ing eroy Ohio	ing eroy Ohio	
Re-screened lump.....	\$1.50 \$1.60	Mine-run.....	\$1.15 \$1.15 \$1.05
Inch and a quarter.....	1.40 1.40 \$1.40	Nut, pea and slack.....	.90 .95 .90
Three-quarter-inch.....	1.35 1.35	Coarse slack.....	.80 .85 .80
Nut.....	1.25 1.25		

### CINCINNATI

**Continued cold weather stiffened the market some but domestic demand is limited. Steam grades in good demand, and contracting is at higher prices.**

The trade was helped out to some extent by some severely cold weather which forced buyers into the market, though buying was limited, as a rule, to carload lots. Operators now expect little of the domestic market until Lake shipping starts, and in view of the late season this is not expected at an early date. Screenings continue the most active, on account of limited production and the great activity in the coke market. Prospects for extensive industrial prosperity during the year, has stimulated contracting and contract prices. Consumers and dealers are beginning to get together on 1916 fuel supply, and reports indicate that figures will run from 10 to 15c. higher than last year.

### DETROIT

**Steam coal more active but less buying in the domestic trade. Anthracite sluggish.**

**Bituminous**—Some of the steam coal users are buying more freely; the orders are not large but seem to come more regularly than in recent weeks. Three-quarter lump is in fairly good demand, but the most interest continues to center around fine coal. Domestic grades are duller. Domestic lump

from Hocking Valley mines holds at about \$1.50. Large amounts of consignment coal coming into the city seem to have no weakening effect on the general market and the greater proportion is moved at prices closely around schedule.

**Anthracite**—Chestnut and stove sizes of anthracite, still find buyers, though interest of consumers and retail dealers appears slight. The present winter schedule of prices will continue in force until the end of April.

**Lake Trade**—Shippers are still in search of vessel capacity to move coal up the Lakes, especially to ports on Lake Michigan. Several freighters have loaded anthracite at Buffalo for delivery when ice conditions permit. It is expected others will load soft coal at Lake Erie ports this week. No change in rates of 30c. to Lake Superior ports and 35 cents to ports near the head of Lake Michigan has been reported.

## COKE

### CONNELLSVILLE

**Sharp break the early part of the week. No further interest in contract furnace coke. Production makes new high record.**

The two contracts for furnace coke for delivery to the end of the year, reported a week ago, do not seem to be the forerunner of any general contracting movement. There are very few idle furnaces still to come in, while the majority of those in operation are covered on coke for the year rather than the half year. Those who must buy for the second half seem content to wait, feeling no doubt that if the general iron and steel situation should grow stronger they have a protection in the additional byproduct ovens that are to be completed in the next few months, as detailed in last report.

There was a sudden break early in the week for spot shipment and there were numerous small offerings at \$3.25 @ 3.50, a decline from the market at the close of last week. The offerings were in greater number than for weeks past although they were only of small tonnages. Last month coke sold for second half shipment at \$2.50 and although more recently contracts were closed at \$3 it now looks as though moderate prices would prevail since there is to be no coal mining suspension in the union coal districts and Connellsville will therefore not be called upon for any coal on that account while additional byproduct coke ovens are to begin coming in next month.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Mar. 11 at 457,894 tons, a new high record for a week on this movement, and an increase of 13,552 tons from the preceding week, and shipments at 463,244 tons, an increase of 25,206 tons.

**Chicago**—Foundry coke has advanced from 25c. to 50c. per ton this week. Domestic sizes are quite strong, and retailers have been heavy buyers. Some trouble is encountered in getting enough box cars to make shipments. Prices per net ton f.o.b. cars Chicago are as follows: Connellsville, \$6.50; Wise County, \$6.25 @ 6.50; By-Product Foundry, \$6.50; By-Product Domestic, \$5 @ 5.25; Gas House, \$4.75.

**St. Louis**—A steady coke movement is being maintained for all sizes and kind in use for manufacturing purposes. The season for domestic demand is nearing the end, consequently little is moving. The following prices, per net ton, are in effect f.o.b. cars St. Louis. Byproduct (all sizes), \$5.25; Gas-house (lump and egg), \$4.50; Petroleum (lump), \$6.75.

## MIDDLE WESTERN

### GENERAL REVIEW

**Spot prices soft with weakening tendency. Domestic demands nil. Steam coals spotty. Contract prices advancing. Anthracite shows slight improvement.**

Inactivity prevails in Western trade circles this week, the weather being warm and springlike. Prices show a softening tendency and the domestic demand has ceased almost entirely. Coarse steam coals are spotty, but screenings generally maintain their strength. West Virginia coals are far from buoyant, and prices in Western territory except on mine-run are weak. Moderate temperatures have brought about a slackening in demand on the part of retailers for domestic sizes, and dealers seem to be endeavoring to make present stocks carry them over into the warm weather. The wage settlement has also caused dealers to feel that no hasty action is necessary in renewing their supplies.

More or less attention is centered on contract business. Shippers generally seen unable as yet to determine the exact

effect of the increased wages upon the cost of production. Local wage settlements yet to be made in many districts will have more or less effect on future quotations. It is said the contract market is stronger than it was last year; fine coal seems sure to rise 5c. to 10c. per ton. Efforts are being put forth to make contract prices the minimum figures at which spot fine coal will be sold during the season. It is evident that there will be considerable sparring as to new prices before contracting will reach a settled basis. In some quarters it was expected that a marked break in prices would occur as a result of the wage settlement in New York, but this was not the case. Car supply has been abundant, and transportation of Western coals has not been delayed.

### CHICAGO

**Domestic demand slumps. Spot coal sold at concessions. Screenings very strong.**

Franklin County operators will ask \$1.45 for domestic 6-in. lump, egg and No. 1 nut after Apr. 1, which is 10c. higher than the circular prices last year. Box car shipments will call for 10c. per ton extra. No. 2 nut will be sold at \$1.35; No. 3 chestnut and No. 4 pea at \$1.25; mine-run at \$1.25, and 2-in. screenings at 90c. Domestic business at Southern Illinois mines this week has disappeared, and a good deal of unsold coal has accumulated. The few orders filled have been shipped at concessions. Retailers are apparently waiting for the new price list before replenishing supplies. Screenings have been firm at around 95c. to \$1. The mines have been operating about half time. Williamson County mines have had about four days operating time this week.

Springfield coals are quiet with screenings fairly steady at 85c. to 90c. per ton. The demand for coarse steam sizes has declined perceptibly.

Indiana domestic demand is light, and the steam movement is slackening. Railroads have begun to use coal from storage piles instead of taking shipments direct from the mines; retailers are cleaning up surplus stocks, and are buying only for present needs. The demand for screenings, however, exceeds the supply, and prices for fine coal have stiffened somewhat.

Dissatisfaction is expressed by the trade over the new circular covering West Virginia smokeless coals. The increased mine-run basis will not be effective in this territory. Mine-run continues firm, but prepared sizes are moving at heavy concessions. It is hoped that the opening of navigation will afford some relief to the situation.

Most Kentucky coals are soft except Miller's Creek, prices for which remain unchanged. Quotations in some instances have been greatly reduced to move cars in transit and prevent demurrage. Increased efforts are being made by some Kentucky shippers to place additional tonnage, particularly gas coals, in Southern Michigan and Northern Indiana and Kentucky coals will undoubtedly be an increasing factor in competing with West Virginia, Indiana and Lake coals in that territory.

The anthracite situation is a speculative one, and most retailers are awaiting the outcome of the Eastern negotiations to see whether there will be any advance in the cost of producing coal or change in sizes. Retailers' stocks are light, and they show indifference as to future needs. But little buying will be done until after Apr. 1.

Quotations in the Chicago market are as follows per net ton f.o.b. cars mines:

	Williamson and Franklin Co.	Springfield	Sullivan	Clinton	Knox and Greene Cos
Lump	\$1.50@1.75	\$1.40@1.65	\$1.60@1.70	\$1.50@1.65	\$1.60@1.70
Steam lump	....	1.25@1.35	1.20@1.30	1.25@1.30	1.35
2½ and 3-in. lump	....	....	1.30@1.35	....	1.25@1.30
1½-in. lump	....	....	1.30@1.35	1.25@1.35	....
Egg	1.50@1.75	1.40@1.65	1.20@1.25	1.25@1.45	1.25@1.35
Nut	1.50@1.75	1.45@1.65	....	1.15@1.30	1.15@1.25
No. 1 washed	1.50@1.75	....	....	....	....
No. 2 washed	1.40@1.50	....	....	....	....
No. 1 nut	1.50@1.75	....	....	....	....
No. 2 nut	1.40@1.50	....	....	....	....
Mine-run	1.15@1.25	1.10@1.15	1.10@1.15	1.05@1.10	1.05@1.15
Screenings	95@1.00	.85@.90	.80@.85	.90@.95	.90@1.00
 Harrisburg & Saline Co. E. Kentucky W.Va. Smok'l. Smokeless Hocking					
Lump	\$1.50@1.75	\$1.35@2.40	\$1.50@2.00	\$1.50@2.00	\$1.75@1.85
1½-in. lump	1.30@1.35	1.25@1.35	....	....	1.50@1.65
Egg	1.50@1.65	1.25@2.00	1.50@2.00	1.50@2.00	1.60@1.75
Nut	1.50	1.15@1.70	1.40@1.65	1.40@1.75	....
No. 1 nut	1.50@1.75	....	....	....	....
No. 2 nut	1.0	....	....	....	....
Mine-run	1.10@1.15	1.05@1.25	1.25@1.40	1.20@1.40	1.10@1.25
Screenings	95@1.00	.85@1.00	....	....	75@1.00

### INDIANAPOLIS

**Less pressure for coal but the market continues firm. Occasional shortages are noted.**

There has been less pressure for coal since the wage agreement was effected, though it developed that there is some uncertainty as to whether the scale arranged at the New

York conference will be confirmed by the Indiana miners. It is understood that the new agreement will not provide for any increase at all at the mines in the northern part of the state, but the International officers are endeavoring to convince the miners that the agreement was arranged upon as being to the best interest of the national industry.

Consumers are inclined to hold out for lower prices, but the inadequate car supply is affecting the rate of delivery and proving a strong sustaining influence in the market, and operators continue firm on prevailing prices. Consumers are occasionally hard-pressed for coal to keep their plants operating, due to the irregular delivery, but as a rule the storage supplies accumulated in anticipation of a possible suspension have been of material assistance in carrying consumers over.

#### ST. LOUIS

**Domestic movement continues light. Industrial consumption falling off. Lump prices decline. Screenings inactive and slightly weaker.**

The market has about reached the stage usually set for early April. The dealer is devoting his efforts to the movement of yard reserves which are disappearing rapidly. His purchases in the market are at the minimum and only when a carload has been sold in advance of delivery. The colder weather of the past few days has failed to stir up anything. Prices for domestic sizes have declined 10 to 15c. per ton.

Manufacturers have cut off all storage orders and many have commenced using their storage piles while others are only buying the minimum amount for immediate necessities. The result borders upon the customary spring depression. Prices covering all of the larger steam sizes are being gradually forced downward with a drop during the week of 5 to 10c. per ton. Screenings are temporarily inactive and while holding better than any other size, they have slumped off in spots 5c. per ton.

Little demand exists for high grades from Southern Illinois. Large stocks are accumulating at the mines and prices are lower by 25 to 35c. per ton. Transit and demurrage coal is offered at 50c. per ton off the list. Screenings while showing a firmer tendency have suffered slightly in prices.

Operating time in the Standard, Intermediate, Mt. Olive and Staunton and Montgomery County districts varies from one to five days per week. In Williamson and Franklin Counties from three to six days per week.

Following is the range of prices, per net ton, f.o.b. cars at the mines:

	Williamson and Franklin	Staunton and Mt. Olive	Mont- gomery Co.	Inter- mediate	Standard
8-in. lump..				\$1.15@1.40	\$1.00@1.15
6-in. lump..	\$1.35@1.75	\$1.25@1.40	\$1.25@1.40	1.15@1.40	1.00@1.15
3-in. lump..	1.35@1.75	1.25@1.35		1.15@1.40	
2-in. lump..	1.25@1.40	1.15@1.25		1.10@1.20	.80@1.00
1½-in. lump..	1.20@1.40			1.15@1.25	1.05@1.15
6x3-in. egg..	1.35@1.75			1.25@1.40	1.00@1.15
6x2-in. egg..				1.15@1.25	1.05@1.15
6x1½-in. egg..	1.20@1.40			1.15@1.25	.80@.90
No. 1 nut..	1.20@1.50			1.15@1.25	.80@.90
No. 2 nut..	1.15@1.40	.90@1.00		1.05@1.05	.75@.90
Mine run..	1.05@1.15	1.05@1.10	1.05@1.10	1.00@1.10	.80@.90
Screenings..	.80@.90	.75@.90	.75@.90	.70@.80	.70@.80
Washed:					
No. 1 nut..	1.50@1.75	1.40@1.50		1.40@1.50	1.40@1.50
No. 2 nut..	1.25@1.50	1.25@1.40		1.25@1.40	1.25@1.40
No. 3 nut..	1.15@1.50	1.25@1.35		1.25@1.35	1.25@1.35
No. 4 pea..	1.20@1.40	1.15@1.25		1.15@1.25	1.15@1.25
No. 5 slack..	.80@.90	.80@.90		.75@.85	.75@.85

#### KANSAS CITY

Domestic coal is overabundant, with prices tending to a decline. Moderate temperatures have reduced the demand sharply. The steam-coal demand continues strong, with prices firm and supplies adequate.

## PRODUCTION AND TRANSPORTATION STATISTICS

#### SOUTHWESTERN TONNAGE

The following is a comparative statement of the Southwestern tonnage for November and December of 1914 and 1915 and for the full years:

State	November		December		Year	
	1914	1915	1914	1915	1914	1915
Missouri...	252,105	276,728	285,547	267,715	2,762,211	2,722,463
Kansas....	591,383	611,877	643,213	634,223	6,162,776	6,134,950
Arkansas...	141,554	174,867	123,737	111,003	1,643,881	1,379,427
Oklahoma...	332,515	287,418	352,267	306,282	3,379,031	2,990,430
	1,317,557	1,350,890	1,404,764	1,319,223	13,947,899	13,227,270

#### COAL AGE

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#### NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during February and the preceding three months in short tons:

	November	December	January	February
Pocahontas Field.....	1,482,015	1,387,033	1,487,189	1,434,153
Tug River District.....	339,154	328,558	343,516	333,102
Thacker District.....	268,299	258,980	284,135	254,933
Kenova District.....	92,587	86,724	89,459	83,218
Cinch Valley District.....	118,553	123,528	131,242	124,626
Other N. & W. Territory.	5,277	7,127	4,547	3,616
Total N. & W. Fields..	2,305,885	2,191,950	2,340,088	2,233,668
Williamson & Pond Creek	90,052	87,365	96,436	100,985
Tug River & Ky. R.R....	57,039	51,919	58,045	50,925
All other railroads.....	245,730	139,593	158,840	168,798
Grand total.....	2,698,706	2,470,827	2,653,409	2,554,376

#### VIRGINIAN RAILWAY

Shipments of coal over this road for January of the current year amounted to 471,158 short tons.

## I. C. C. DECISIONS

#### I. C. C. No. 669 Investigation and Suspension Docket—Coal from Colorado and Wyoming mines.

Proposed increased rates on bituminous coal in carloads from mines in Colorado and Wyoming to destinations in Nebraska and Colorado on the lines of the Union Pacific R.R. not justified.

#### I. C. C. No. 6770—Weston Dodson & Co., and Charles M. Dodson & Co. vs. Central Railroad Company of New Jersey.

Reparation awarded on account of unreasonable rates charged for the transportation of anthracite coal from Beaver Brook colliery and Coleraine colliery, in the Lehigh anthracite coal region in Pennsylvania, to Elizabethport, N. J., for transhipment.

#### I. C. C. No. 7804—E. Rickards vs. Seaboard Air Line Ry.

Rates for the transportation of mine-prop logs in carloads from Thelma and Vaughan, N. C., to Portsmouth, Va., found to have been unreasonable and unjustly discriminatory. Reasonable and nondiscriminatory rates prescribed for the future.

## FOREIGN MARKETS

#### GREAT BRITAIN

**Mar. 8**—Prices are somewhat irregular in consequence of shortage of tonnage. Quotations are approximately as follows:

Best Welsh steam.....	Nominal	Best Monmouthshires....	\$7.20@6.78
Best seconds.....	Nominal	Seconds .....	6.48@6.72
Seconds.....	\$7.20@8.28	Best Cardiff smalls.....	3.72@3.96
Best dry coals.....	7.44@7.92	Cargo smalls.....	2.40@3.12

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

**Freight**—Due to tonnage scarcity rates show a further sharp advance all round, and are approximately as follows:

Gibraltar.....	\$12.60	Naples.....	\$21.00	St. Vincent.....	\$10.80
Marseilles.....	20.26	Alexandria.....	21.60	River Plate.....	13.20
Algiers.....	16.40	Port Said.....	22.80		
Genoa.....	21.60	Las Palmas.....	10.32		

#### CHINA

**Shanghai, Feb. 17**—Since a month ago the market in Japan has advanced very rapidly owing to the greatly increased activity in several industries in Japan, both on land and at sea and the freight market has gone up so phenomenally prices have advanced to such an extent as to make business next to impossible.

In Shanghai there has been no actual business done recently on account of the Chinese New Year holidays but the market remains very active and prices are firm.

#### Fushun Coal

Very short supplies.

**Kailan Coal**—Deliveries are being maintained under contract which takes all available tonnage. Any prospective buyers will be forced to pay a big advance on recent prices and figures quoted are quite nominal.

#### SOUTH AFRICA

The South African coal production for the past four years compares as follows: 1912, 8,117,078 tons; 1913, 8,801,216; 1914, 8,477,923; 1915, 8,281,311.